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CLAIMS

[Claim(s)]
[Claim 1](1) a hypodermic needle part and (2) -- using the tip side opening of the 1st approximately cylindrical cylindrical body as a hypodermic needle part installation part, closing this tip opening airtightly with a hypodermic needle attaching rubber stopper, and a releasing part of the back end with the 1st sealing plug, [close and] Discontinuity prolonged along a cylinder axial direction is provided in a wall surface of a cylindrical body, The container a filled up with concentration medicine by the interior of a room formed by this hypodermic needle attaching rubber stopper and this 1st sealing plug in this cylindrical body. (3) Close the tip side opening of the 2nd cylindrical body with the 2nd sealing plug, and close other open end parts with the 3rd sealing plug, this -- the container b in which the interior of a room formed by this 2nd sealing plug and the 3rd sealing plug in the 2nd cylindrical body comes to fill up a liquid drug. (4) A back end releasing part which has (1) - (4) of pusher bar ** attached to ** of the rear of the 3rd sealing plug of the above, and was closed with this 1st sealing plug of this container a, This 1st sealing plug and this 2nd sealing plug are moved to this discontinuity by sticking airtightly a tip opening closed with the 2nd sealing plug of this container b, combining this container a and this container b with one, attaching this pusher bar to this ** of this 3rd sealing plug at the time of use, and pushing in this 3rd sealing plug in this container b, Since the cylinder axial direction length of this discontinuity is set up for a long time than the sum of the cylinder axial direction length of the 1st sealing plug of the above, and the cylinder axial direction length of the 2nd sealing plug of the above, this discontinuity forms a passage which opens inside of this container a and this container b for free passage, In an injector which this liquid drug in this container b flows in this container a via this passage, mixes with this concentration medicine, and serves as an injection, An injector which combined two rooms, wherein combination of this above-mentioned container a and this container b is based on screwing of a screw thread screwed on a back end releasing part wall surface of this container a, and a screw thread screwed on a tip opening wall surface of this container b.
[Claim 2]An injector which combined the two rooms according to claim 1, wherein a screw thread of the above-mentioned container a is a female screw screwed on an internal peripheral wall surface of a rear end part and a screw thread of the above-mentioned container b is a male screw screwed on an outer peripheral wall surface of a tip opening.
[Claim 3](1) a hypodermic needle part and (2) -- using the tip side opening of the 1st approximately cylindrical cylindrical body as a hypodermic needle part installation part, closing this tip opening airtightly with a hypodermic needle attaching rubber stopper, and a releasing part of the back end with

the 1st sealing plug, [close and] Discontinuity prolonged along a cylinder axial direction is provided in a wall surface of a cylindrical body, The container a filled up with concentration medicine by the interior of a room formed by this hypodermic needle attaching rubber stopper and this 1st sealing plug in this cylindrical body. (3) Close the tip side opening of the 2nd cylindrical body with the 2nd sealing plug, and close other open end parts with the 3rd sealing plug, this -- the container b in which the interior of a room formed by this 2nd sealing plug and the 3rd sealing plug in the 2nd cylindrical body comes to fill up a liquid drug. (4) A back end releasing part which has (1) - (4) of pusher bar ** attached to ** of the rear of the 3rd sealing plug of the above, and was closed with this 1st sealing plug of this container a, This 1st sealing plug and this 2nd sealing plug are moved to this discontinuity by sticking airtightly a tip opening closed with the 2nd sealing plug of this container b, combining this container a and this container b with one, attaching this pusher bar to this ** of this 3rd sealing plug at the time of use, and pushing in this 3rd sealing plug in this container b, Since the cylinder axial direction length of this discontinuity is set up for a long time than the sum of the cylinder axial direction length of the 1st sealing plug of the above, and the cylinder axial direction length of the 2nd sealing plug of the above, this discontinuity forms a passage which opens inside of this container a and this container b for free passage, In an injector which this liquid drug in this container b flows in this container a via this passage, mixes with this concentration medicine, and serves as an injection, An injector which combined two rooms having a notch or one or more concave pits which combination of this container a and this container b is based on screwing of a screw thread screwed on a back end releasing part wall surface of this container a, and a screw thread screwed on a tip opening wall surface of this container b, and go to a cylinder axial direction from an open end part of the back end of this container a.

[Claim 4]An injector which combined the two rooms according to claim 1 or 3, wherein a screw thread of this container a is a male screw screwed on an outer peripheral wall surface of a rear end part and a screw thread of this container b is a female screw screwed on an internal peripheral wall surface of a tip opening.

[Claim 5](1) hypodermic needle part characterized by comprising the following, and (2) -- the tip side opening of the 1st approximately cylindrical cylindrical body being used as a hypodermic needle part installation part, and, Close this tip opening airtightly with a hypodermic needle attaching rubber stopper, and a releasing part of the back end is closed with the 1st sealing plug, Discontinuity prolonged along a cylinder axial direction is provided in a wall surface of a cylindrical body, The container a filled up with concentration medicine by the interior of a room formed by this rubber stopper and this 1st sealing plug in this cylindrical body. (3) Close the tip side opening of the 2nd cylindrical body with the 2nd sealing plug, and close other open end parts with the 3rd sealing plug, The container b in which the interior of a room formed by this 2nd cylindrical body, this 2nd sealing plug, and the 3rd sealing plug comes to fill up a liquid drug. (4) A back end releasing part which has (1) - (4) of pusher bar ** attached to ** of the rear of the 3rd sealing plug of the above, and was closed with this 1st sealing plug of this container a, This 1st sealing plug and this 2nd sealing plug are moved to this discontinuity by sticking airtightly a tip opening closed with the 2nd sealing plug of this container b, combining this container a and this container b with one, attaching this pusher bar to this ** of this 3rd sealing plug at the time of use, and pushing in this 3rd sealing plug in this container b, Since the cylinder axial direction length of this discontinuity is set up for a long time than the sum of the cylinder axial direction length of the 1st sealing plug of the above, and the cylinder axial direction length of the 2nd sealing plug of the above, this discontinuity forms a passage which opens inside of this container a and this container b for free

passage, An injector which this liquid drug in this container b flows in this container a via this passage, mixes with this concentration medicine, and serves as an injection.
A screw thread which combination of this above-mentioned container a and this container b screwed on a back end releasing part outer peripheral wall surface of the container a.
About a screw thread screwed on a tip opening outer peripheral wall surface of the container b, it is a larger inside diameter than an outer diameter of this container a and this container b.

[Claim 6]An injector which combined the two rooms according to any one of claims 1 to 5, wherein an outer diameter of the above-mentioned container a main part is substantially [as an outer diameter of the above-mentioned container b main part] equal, and its inside diameter of the above-mentioned container a main part is substantially [as an inside diameter of the above-mentioned container b main part] equal or it is a little large.
[Claim 7]An injector which combined the two rooms according to any one of claims 1 to 6, wherein an inside diameter of the above-mentioned container a main part is larger than an inside diameter of the above-mentioned container b main part.
[Claim 8]An injector which combined the two rooms according to any one of claims 1 to 7, wherein wall thickness of the above-mentioned container a main part and wall thickness of the above-mentioned container b main part are equal or their one side is thicker than another side.
[Claim 9]rotation of a screw thread -- 30 degrees - 360 degrees -- the above-mentioned container a and the above-mentioned container b -- an injector which combined the two rooms according to any one of claims 1 to 8 making large a pitch of a screw thread of this container a, and a screw thread of this container b so that it can join together firmly.
[Claim 10]An injector which combined the two rooms according to any one of claims 1 to 9 being the concave slots which the above-mentioned discontinuum provided along a cylinder axial direction.
[Claim 11]An injector which combined the two rooms according to any one of claims 1 to 10, wherein the above-mentioned discontinuum consists of peak parts and a trough of a section triangle periodically located in a line with a single tier along a cylinder axial direction.
[Claim 12]By making a tip opening of the container a stop a rubber stopper characterized by comprising the following on which a cap was put and this cap was put in the state of half-capping, An injector which combined the two rooms according to any one of claims 1 to 11 being what currently can form a passage which notching of an inside of container a and a rubber stopper and notching of a cap opened for free passage.
A rubber stopper which closes a tip opening of the above-mentioned container a has the leg, and is notching in this leg.
A cylindrical tube part which has provided an annular projection in a peripheral face, has notching in this rubber stopper at a skirt part, and was projected to a top panel.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]In this invention, save the medicine of a stipulated amount stably in detail in each interior of a room of this injector, respectively, while makes the inside of both containers open for free passage about the injector which combined two rooms in the case of administration, and Takumi's medicine is moved to other **.
Therefore, it is related with improvement of the injector of the type which mixes both and is used as the parenteral solution which can be prescribed for the patient.

[0002]
[Description of the Prior Art]The kit which stores drugs (drug solution) inside the pipe of an injector, and can save and set them inside is known as an injector with which an emergency can be medicated sanitarily promptly.
pre-filled one -- disposable. It is called the syringe (Pre filled disposable syring).
On the other hand, generally, medicine with preservation unstable as a parenteral solution by solution states is used as powdered drugs by processing of freeze-drying etc., immediately after mixing with a solution at the time of use and considering it as a parenteral solution, a medicine is prescribed for the patient, but as for the mixture operation in the time of a certain use, it is also complicated to require emergency, and it has the danger of contamination. Then, divide a glass syringe into two rooms, and the powder agent and the solution are dissociated and saved [fill up with and] beforehand in each interior of a room, Since the container and injector pharmaceutical preparation of the two-room type which opens two rooms for free passage at the time of use, and can generate a parenteral solution is developed and the simple nature of operation, certainty, and sanitary quick administration have an advantage of possible **, a user appreciates and the amount used is also increasing.
[0003]Drawing 18 is an outline sectional view of an example of elegance conventionally, and from the body part of the pipe 50, an outer diameter becomes thin and is having structure projected tubular so that it can equip with a hypodermic needle, and the point 51 of the syringe cum container 50 (it abbreviates to a pipe) has inserted in other open ends densely the piston 52 which can be engaged in a pusher bar. The injection groove 53 of the pipe 50 which projects on a central periphery mostly was formed, the inside of the pipe 50 was established for the slidable piston 54 in the position by the side of an open end, the inside of the pipe 50 was separated into two rooms from the injection groove 53 approximately, the

plenum chamber 55 is filled up with powder and the after room 57 is filled up with the solution. After such pharmaceutical preparation fills up the plenum chamber 55 with the powder 56 directly, it inserts the piston 54 into a pipe, seals the inside of a plenum chamber, and after it subsequently fills up the after room 57 with the solution 58, it seals and manufactures a releasing part with the piston 52. If the piston 54 which attached the pusher bar behind the piston 52 and stuffed this piston 52 into the back interior of a room now at the time of use and to which press was able to be applied arrives at the injection groove 53, Since the length of this piston 54 is designed shorter than the length of the injection groove 53, both ** are open for free passage, and the solution 58 flows in the plenum chamber 55, is mixed with the powder 56, and turns into a parenteral solution. Administration becomes possible promptly by attaching a hypodermic needle to the point 51. As a container and injector (it may outline the following "division type container and injector") of the structure which divided the inside of such one glass syringe into two rooms with the sealing plug (piston) etc., the thing of a description is mentioned, for example to JP,49-14465,Y.

[0004]The container and injector in which the needle is pasted up on the wall of the glass syringe, this piston will be run through by this needle if it slides on the piston which has separated two rooms at the time of use, and it becomes a passage about this inside of a needle instead of the above-mentioned injection groove, and two rooms are opened for free passage is proposed by JP,54-22315,Y. As the further improvement of such a division type container and injector, JP,58-41568,A, JP,61-48377,A, JP,62-14863,A, JP,62-117566,A, JP,62-270169,A, JP,64-80371,A, JP,H2-5973,A, JP,H3-82476,A, JP, H6-54908,A, etc. are proposed.

[0005]On the other hand, to JP,51-11691,A and U.S. Pat. No. 4031892. As shown in drawing 19, it is filled up with the powder 59 in the glass small containers 61, and container both ends are sealed with the collar-head rubber stopper 63 and the piston 65, The syringe cum container of the 2 container knot pattern which was filled up with the diluent 60 in the container 62, sealed with the collar-head rubber stopper 64 and the rubber stopper 66, and made both containers one with the plastic packaging object 67 is proposed. the hypodermic needle 69 which inserted the small containers 61 and 62 in the electrode holder 68 shown in drawing 20 in the case of administration, and was fixed to the electrode holder -- the rubber stopper 62 and the rubber stoppers 64 and 63 with a flange -- one by one -- a puncture -- it penetrates. If the needle tip of the hypodermic needle 69 reaches the powder 59, from the opening 71 in the middle of the hypodermic needle 69, the diluent 60 flows in the container 61 via the inside of a hypodermic needle, will mix [the powder 59 and], will dissolve, and will serve as a drug solution. If a pusher bar is attached and pushed on the piston 65, a drug solution passes along the inside of the hypodermic needle 69 in parenteral solution administration, and can flow into it out of the hypodermic needle 70.

[0006]Thus, since [that its workability in a pharmaceutical preparation process etc. is high and] it can be filled up with medicine, a solution, etc. which require freeze-drying etc. in another container, and can be manufactured, and the injector of the type which connected two cells (room) has one small container size, its number which can be processed at once increases and it is more advantageous than a division type. As the further improvement, JP,H4-354954,A, JP,H5-31191,A, There is a proposal indicated to JP, H6-7446,A, JP,H6-142203,A, JP,7-136267,A, JP,H7-136264,A, JP,H7-148261,A, publication of unexamined utility model application Heisei 5-152, publication of unexamined utility model application Heisei 5-86353, JP,6-13832,U, etc.

[0007]

[Problem to be solved by the invention]In the above-mentioned conventional technology, still in short, a complicated process of operation is added to drugs restoration to an injector, there is a problem of quality maintenance, such as a fall of the drugs potency by a scale loss bacillus, in it, and problems which should be solved, such as simplification of a sterilization process and reduction of the merchandise price by pharmaceutical preparation equipment and drugs cost reduction, remain plentifully further. This invention can maintain more at an altitude the stability of the medicine which has an unstable medicine and the necessity for potency maintenance especially by saving two kinds of medicine in another container in view of such the actual condition for the purpose of the further improvement of the injector which combined two rooms, When using it, by easier operation, both medicine can be mixed and a medicine can be immediately prescribed for the patient sanitarily, let it be SUBJECT to provide the highly efficient and quality syringe cum container which can satisfy the demand of that sterilization can operate it easily in a pharmaceutical preparation process, considering it as the structure which can moreover apply advanced pharmaceutical preparation technology easily sanitarily in the bottom clean room of sterilization and for which the present drugs are asked.

[0008]

[Means for solving problem]It is this invention as a means for solving an aforementioned problem, [1] (1) a hypodermic needle part and (2) -- using the tip side opening of the 1st approximately cylindrical cylindrical body as a hypodermic needle part installation part, closing this tip opening airtightly with a hypodermic needle attaching rubber stopper, and a releasing part of the back end with the 1st sealing plug, [close and] Discontinuity prolonged along a cylinder axial direction is provided in a wall surface of a cylindrical body, The container a filled up with concentration medicine by the interior of a room formed by this hypodermic needle attaching rubber stopper and this 1st sealing plug in this cylindrical body. (3) Close the tip side opening of the 2nd cylindrical body with the 2nd sealing plug, and close other open end parts with the 3rd sealing plug, this -- the container b in which the interior of a room formed by this 2nd sealing plug and the 3rd sealing plug in the 2nd cylindrical body comes to fill up a liquid drug. (4) A back end releasing part which has (1) - (4) of pusher bar ** attached to ** of the rear of the 3rd sealing plug of the above, and was closed with this 1st sealing plug of this container a, This 1st sealing plug and this 2nd sealing plug are moved to this discontinuity by sticking airtightly a tip opening closed with the 2nd sealing plug of this container b, combining this container a and this container b with one, attaching this pusher bar to this ** of this 3rd sealing plug at the time of use, and pushing in this 3rd sealing plug in this container b, Since the cylinder axial direction length of this discontinuity is set up for a long time than the sum of the cylinder axial direction length of the 1st sealing plug of the above, and the cylinder axial direction length of the 2nd sealing plug of the above, this discontinuity forms a passage which opens inside of this container a and this container b for free passage, In an injector which this liquid drug in this container b flows in this container a via this passage, mixes with this concentration medicine, and serves as an injection, An injector injector which combined two rooms, wherein combination of this above-mentioned container a and this container b is based on screwing of a screw thread screwed on a back end releasing part wall surface of this container a and a screw thread screwed on a tip opening wall surface of this container b is provided. The above especially characterized by a screw thread of this container a being a female screw screwed on an internal peripheral wall surface of a rear end part as a desirable embodiment of this invention, and a screw thread of this container b being a male screw screwed on an outer peripheral wall surface of a tip opening [1]An injector of a description is mentioned. This invention, [2](1) a hypodermic needle part

and (2) -- using the tip side opening of the 1st approximately cylindrical cylindrical body as a hypodermic needle part installation part, closing this tip opening airtightly with a hypodermic needle attaching rubber stopper, and a releasing part of the back end with the 1st sealing plug, [close and] Discontinuity prolonged along a cylinder axial direction is provided in a wall surface of a cylindrical body, The container a filled up with concentration medicine by the interior of a room formed by this hypodermic needle attaching rubber stopper and this 1st sealing plug in this cylindrical body. (3) Close the tip side opening of the 2nd cylindrical body with the 2nd sealing plug, and close other open end parts with the 3rd sealing plug, this -- the container b in which the interior of a room formed by this 2nd sealing plug and the 3rd sealing plug in the 2nd cylindrical body comes to fill up a liquid drug. (4) A back end releasing part which has (1) - (4) of pusher bar ** attached to ** of the rear of the 3rd sealing plug of the above, and was closed with this 1st sealing plug of this container a, This 1st sealing plug and this 2nd sealing plug are moved to this discontinuity by sticking airtightly a tip opening closed with the 2nd sealing plug of this container b, combining this container a and this container b with one, attaching this pusher bar to this ** of this 3rd sealing plug at the time of use, and pushing in this 3rd sealing plug in this container b, Since the cylinder axial direction length of this discontinuity is set up for a long time than the sum of the cylinder axial direction length of the 1st sealing plug of the above, and the cylinder axial direction length of the 2nd sealing plug of the above, this discontinuity forms a passage which opens inside of this container a and this container b for free passage, In an injector which this liquid drug in this container b flows in this container a via this passage, mixes with this concentration medicine, and serves as an injection, A screw thread which combination of this container a and this container b screwed on a back end releasing part wall surface of this container a, It is based on screwing of a screw thread screwed on a tip opening wall surface of this container b, and an injector which combined two rooms having a notch or one or more concave pits which go to a cylinder axial direction from an open end part of the back end of this container a is provided. especially, as a desirable embodiment of this invention, a screw thread of this container a is a male screw screwed on an outer peripheral wall surface of a rear end part, and a screw thread of this container b was screwed on an internal peripheral wall surface of a tip opening -- an injector which combined the two rooms according to claim 1 or 3 being female screws -- the above characterized by things [1]or[2]An injector of a description is mentioned. Furthermore, it is this invention, [3](1) a hypodermic needle part and (2) -- using the tip side opening of the 1st approximately cylindrical cylindrical body as a hypodermic needle part installation part, closing this tip opening airtightly with a hypodermic needle attaching rubber stopper, and a releasing part of the back end with the 1st sealing plug, [close and] Discontinuity prolonged along a cylinder axial direction is provided in a wall surface of a cylindrical body, The container a filled up with concentration medicine by the interior of a room formed by this rubber stopper and this 1st sealing plug in this cylindrical body. (3) Close the tip side opening of the 2nd cylindrical body with the 2nd sealing plug, and close other open end parts with the 3rd sealing plug, The container b in which the interior of a room formed by this 2nd cylindrical body, this 2nd sealing plug, and the 3rd sealing plug comes to fill up a liquid drug. (4) A back end releasing part which has (1) - (4) of pusher bar ** attached to ** of the rear of the 3rd sealing plug of the above, and was closed with this 1st sealing plug of this container a, This 1st sealing plug and this 2nd sealing plug are moved to this discontinuity by sticking airtightly a tip opening closed with the 2nd sealing plug of this container b, combining this container a and this container b with one, attaching this pusher bar to this ** of this 3rd sealing plug at the time of use, and pushing in this 3rd sealing plug in this container b, Since the cylinder axial direction length of this discontinuity is set up for a long time

than the sum of the cylinder axial direction length of the 1st sealing plug of the above, and the cylinder axial direction length of the 2nd sealing plug of the above, this discontinuity forms a passage which opens inside of this container a and this container b for free passage, In an injector which this liquid drug in this container b flows in this container a via this passage, mixes with this concentration medicine, and serves as an injection, A screw thread which combination of this above-mentioned container a and this container b screwed on a back end releasing part outer peripheral wall surface of the container a, An injector which combined two rooms being because it screws, respectively with a screw thread which screwed a screw thread screwed on a tip opening outer peripheral wall surface of the container b on an internal peripheral wall surface of a tubed connector which has a larger inside diameter than an outer diameter of this container a and this container b is provided.

[0009]

[An embodiment of the invention and an embodiment] Although this invention is characterized [first] by the point by screwing which formed combination of this container in the container end and which ****s (screw) in the container and injector of a two-room knot pattern, an embodiment explains the features, such as structure of this invention, and its mechanism of action, in detail. Drawing 1 is one embodiment of this invention a shown sectional view, and the syringe cum container (it may outline the following "injector") 1, Each is a structure which combines the cylindrical body a (it is written also as the pipe a below) and the cylindrical body b (it is written also as the pipe b below) which are the containers stored like a graphic display of powder or concentration medicine, and a liquid chemical (it is also called a drug solution) with the screw thread formed in the pipe a and the b itself. Drawing 2 is a sectional view showing the state where the injector of drawing 1 before medicine restoration was divided into the pipe a and the pipe b.

[0010]The pipe a has the point thinner than the cylindrical main part 2 and the main part 2 projected tubular, caps and closes the rubber stopper 3 to the clear aperture of this point, and has fixed the rubber stopper 3 to the clear aperture by cap C_1 further. It is having structure which can equip with a hypodermic needle, attaching this rubber stopper 3 and cap C_1 on the occasion of administration. The 1st sealing plug 4 is tightly inserted in the inside of the end of the side combined with other open end parts b of the pipe a, i.e., a pipe, and a container is constituted. In the space (room) formed between the rubber stopper 3 and the 1st sealing plug 4, concentration medicine, It is filled up with the solid medicine (it is hereafter named concentration medicine generically) 5, such as freeze-drying medicine, a crystal, granulation, powder, and tablet medicine, the inside of a container is thoroughly sealed with this rubber stopper 3 and the 1st sealing plug 4, it holds airtightly, and the quality of the concentration medicine 5 is maintained over a long period of time. A little than a cylinder axial direction center section in the position from the 1st sealing plug in the wall surface of the pipe a main part 2, The discontinuity 6 for forming a bypass flow path between two rooms is formed in recessed groove form along a cylinder axial direction, and the cylinder axial direction length of this discontinuity 6 is made larger than the sum total of each cylinder axial direction length of the 1st sealing plug 4 and the 2nd sealing plug 10 mentioned later. As for this 1st sealing plug 4, about the construction material, it is desirable to take into consideration enough and to choose so that the slidability in a pipe can also be secured.

[0011]The screw thread 7 (concave screw) of ** with which a wall was engraved is formed in an open end circles circumference of the pipe a main part 2. moreover -- a periphery of a point of the pipe b -- eye the above -- **** -- the screw thread (convex screw) 8 of backlash is screwed on in a pitch which

can be screwed in the screw thread (screw) 7, and the maximum of an outer diameter of the screw thread 8 is made smaller than an outer diameter of the pipe b main part 9. The pipe a and the pipe b are simply and firmly combinable by screwing these screw threads 7 and 8, and in this example, outer diameter D_1 of the pipe a and outer diameter D_2 of the pipe b can form one cylindrical body, without producing unevenness in a connecting part, since it is almost the same. In an example of a graphic display, a screw thread of ** is screwed on the pipe a, a screw thread of backlash is screwed on the pipe b, and ** can also form a screw thread of backlash in the pipe a, and can also form a screw thread of ** in the pipe b.

[0012]Insert the 2nd slidable sealing plug 10 in an inside of the tip the pipe b side tightly, have sealed, and in the back end which is another end, The 3rd sealing plug 11 was inserted in tightly and the liquid drugs (it is hereafter named a "drug solution" generically) 12, such as a solution, dispersion liquid, salt solution liquid for physiology, and distilled water for injection, are accommodated in the interior of a room formed between the 2nd sealing plug 10 of the above, and this 3rd sealing plug 11 watertight.

[0013]Even if the above-mentioned pipes a and b and the 1st - the 3rd sealing plug result in low temperature of abbreviation-50 ** in the case of freeze-drying from an elevated temperature in the case of high-pressure steam sterilization, they have construction material and structure which are equal to modification and do not have liquid leakage. That is, these 1st, 2nd, and 3rd sealing plugs 4, 10, and 11 have a little big outer diameter from an inside diameter of the pipe body 2 and the main part 9, and in a sliding surface with a wall of the pipes a and b, as shown in drawing 3, they form the three or more ribs 13, and they have reconciled in it the characteristic of sealing performance with an inner wall of cylinder, and slidability of being contradictory. However, in this invention, sealing performance and slidability can also be reconciled by using a rib-less sealing plug which laminated a synthetic resin film on the surface. In the rear of the 3rd sealing plug 11, a pusher bar is ****ed for being engaged, and ** 14 is formed.

[0014]Although the purpose of this invention can also fully attain the above composition, In this example, sealing performance is improved more by having formed the rubber stopper 15 which has a screw of a still larger outer diameter than rib parts on the periphery behind the 3rd sealing plug 11, and having formed the annular projection 16 in an outer peripheral part which touches an internal surface of the pipe b at this rubber stopper 15.

[0015]An injector of this example combines and manufactures both containers, after being filled up with medicine in the container a and the container b, respectively. The pipe a and the pipe b are simply and certainly combinable in series by doubling and ****ing the back end of the pipe a, and a tip of the pipe b (screw), specifically screwing 7 and 8, and rotating 1-2 times preferably about one to 3 revolution. In order to stick as sanitarily as possible and airtightly the 1st sealing plug 4 and the 2nd sealing plug 10, it is preferred to screw the pipe a and the pipe b under a vacuum in the Klin room.

[0016]There is a method of rolling a periphery of both pipes and fixing on a method, cellophane, or a tape made of a synthetic resin on which a connecting part is pasted up, as a method of combining two cylindrical bodies generally and using as one cylindrical body. However, adhesives applied to cellophane or a tape made of a synthetic resin of commercial adhesives or marketing are synthetic resin glue, and since low exertion nature and a toxic impurity are included so much, joining together simply using these is dangerous with a field of health nature and safety. According to a physical coupling means like this invention, all the above-mentioned danger is canceled.

[0017]Drawing 3 is an outline sectional view showing the state where the drug solution 12 in the pipe b

moves to the pipe a, and is mixed with the concentration medicine 5. That is, it is a sectional view showing the state where the 3rd sealing plug 11 of the pipe b rear ****ed, the pusher bar 18 was attached to ** 14, the pressure got across to the drug solution 12 by pushing in this pusher bar 18 in the pipe 9, the 2nd sealing plug 10 and the 1st sealing plug 4 moved together, and the 1st sealing plug 4 and the 2nd sealing plug 10 reached the discontinuity 6. The discontinuity 6 is a thin concave extended to the pipe length with which the internal surface of the pipe b main part 2 was engraved, and since it has designed become longer than the sum total of the cylinder axial direction length of the 1st sealing plug 4 and the 2nd sealing plug 10, the length, The 1st and 2nd sealing plugs 4 and 10 fit in into the discontinuity 6, and are full, and since the projection 19 is formed in the inner-wall-of-cylinder side of the opposite hand of the discontinuity 6 on the other hand, the tip of the 1st sealing plug 4 stops by this projection 19 temporarily. Between the 1st sealing plug 4 and the 2nd sealing plug 10, and the discontinuity 6 serves as a passage which opens between the pipe a and the pipes b for free passage in this state. The annular projection 20 of the pusher bar 18 serves as a mark of a stop temporarily. The drug solution 12 flows out of the pipe b in the pipe a thoroughly by pushing in a pusher bar until the drug solution 12 flows in into the pipe a and the tip of the 3rd sealing plug 11 contacts the 2nd sealing plug back end by pushing in the pusher bar 18 gradually in the state of a momentary stop of this 1st sealing plug 4. The drug solution 12 and the concentration medicine 5 are mixed within the pipe a, and it becomes drugs of the concentration of regulation. It is also desirable operation to give vibration in order to make easy flows, such as a drug solution in the discontinuity 6, and a remains gas.

[0018]Drawing 4 is the direction sectional view of A-A' of drawing 3, and shows the section vertical to the cylinder axial direction of the discontinuity 6 of the pipe a.

[0019]Drawing 5 is an outline sectional view showing the state of having finished prescribing a parenteral solution for the patient with the injector of this invention. By attaching the hypodermic needle 21 (it is a double ended needle at the example of a graphic display) at the tip of the pipe a, pushing in the pusher bar 18, and moving the 1st sealing plug 4, the 2nd sealing plug 5, and the 3rd sealing plug 11 to the tip inside pipe a, a dissolution drug solution (parenteral solution) flows out via the hypodermic needle 21, and administration completes it. C_2 is a cap.

[0020]This invention can establish a hollow in the tip side of the 1st sealing plug, as shown in drawing 5, and it can make the minimum value quantity of the drug solution 17 which loses the gap around a tip wall, the 1st sealing plug, and a hypodermic needle, and remains in an injector after administration in an injector. Therefore, this invention is suitable for the purpose of prescribing for the patient an expensive medicine with which the injector of the small volume of 0.2-1 ml is used, it is little very much, and potency needs to prescribe a stipulated amount for the patient certainly highly.

[0021]Other embodiments of this invention are shown in drawing 6. In the embodiment of drawing 6, inside diameter d_1 of the main part 2 of the pipe a was thickly designed a little rather than inside diameter d_2 of the pipe b. When setting d_2 to 100, the slide within the pipe a of the 2nd sealing plug 10 becomes easy by designing d_1 in the range of 102-108. It is made the form which has the unevenness by which the peak parts 22 and the trough 23 of a section triangle are periodically repeated in a cylinder axial direction section in this example in discontinuity, The cylinder axial direction length of discontinuity is designed become $L>l_4+l_{10}$ about L and the cylinder axial direction length (thickness) of

the 1st sealing plug 4, if the cylinder axial direction length (thickness) of the l_4 2nd sealing plug 10 is made into l_{10}. In the example of drawing 6, the annular low projection 24 was formed in the contact portion with the 1st sealing plug of the end wall in the pipe a, and the concentration medicine 5 is sealed.

[0022]Drawing 7 is a B-B' sectional view of discontinuity of the pipe a of drawing 6. Since this discontinuity is formed when the projection 22 and the trough 23 of a section triangle follow an internal surface of the pipe a, it changes the 1st sealing plug 4 and the 2nd sealing plug 10, forms the passage 25, and can pass the drug solution 12.

[0023]In each embodiment of this invention shown in drawing 1, drawing 2, and drawing 6, an inside diameter and an outer diameter of a main part of the pipe a and the pipe b were respectively almost equal size. Therefore, although a screw of a connecting part makes wall thickness thin and it is formed, this invention can also make a screw outer diameter almost the same as a body part outer diameter.

[0024]Drawing 8 is an outline sectional view showing the further embodiment of this invention, and on the back end periphery of the pipe a main part 201 in this example the screw thread (screw) 71 of backlash, The screw thread (screw) 81 of backlash is formed in the near end linked to the pipe a back end of the pipe b main part 901, the internal surface of another pipe c -- said screw threads 71 and 81 and screwing -- the screw thread (screw) 26 of dried cuttlefish is formed, it is considered as the connector 27, and the pipe a and the pipe b are unified by screwing with the connector 27, respectively like a graphic display. In this example, although outer diameter D_1 of the pipe a main part 201, outer diameter D_2 of the pipe b main part 901, and inside diameter d_3 of the connector 27 produce some unevenness in a bond part, use of the almost same connector 27, It excels in that there is no evil by the adhesives described above as compared with tape volume immobilization, and immobilization being trustworthier.

[0025]Although the main part of two pipes was the almost same size in the above example, by having adopted combination called screwing in this invention, the body part of two pipes did not necessarily have to be made into the same inside diameter and outer diameter, and it became possible to change the wall thickness and the inside diameter of a pipe, as shown in the following examples. That is, there is a big advantage that the container of suitable wall thickness and an inside diameter can be designed corresponding to a medicine's accommodated in each pipe in this invention pharmaceutical preparation processing and sterilization treatment use top.

[0026]Drawing 9 is a sectional view showing the relation between the screw of the pipe a of the embodiment of this invention, and the pipe b, and a pipe outer diameter. Use the wall of the rear end part of the pipe a main part 202 as the screw thread (crevice) 72 of **, and the screw thread (screw) 82 of backlash is formed in the point periphery of the pipe b main part 902, When making the inside diameter of D_1 and the pipe b into d_2 and making [the inside diameter of the pipe a] an outer diameter into D_2 for d_1 and an outer diameter, in this example, by having enlarged wall thickness of $d_1=d_2$ and $D_1>D_2$ and the pipe a, the pipes a and b are combined in series like a graphic display, and it is considered as the one glass syringe 1.

[0027]Drawing 10 is a sectional view which carries out the approximate account of other embodiments of this invention, and in this example, wall thickness m of the pipe a main part 203 is made very thick, and the graphic display provides the extension 28 so that the periphery by the side of the tip of the

abridged pipe b (pipe a side) may be wrapped in. In this example, it distinguishes between the wall portion from a tip considerably from the end of the pipe a, and a screw thread is formed, a level difference is given like the pipe b and the graphic display is provided, although omitted. Screwing with the screw thread 73 which derived the pipe b in the pipe a by this, and was screwed on the inside becomes easy. If the pitch (width) of the screw 73 is made into width, angle of rotation of a pipe can be strongly combined by torsion up to 30-360 **, i.e., one rotation, and separation is also easy. Since adhesion will improve further if the portion which becomes a shoulder of the body part which follows the screw-thread portion of this pipe b immediately arranges the annular packing 29 in the position which contacts the step part of the above-mentioned pipe a, it is a mode of desirable enforcement.

[0028]Drawing 11 was a sectional view which carries out the approximate account of other embodiments of this invention, in this example, outer diameter D_1 of the main part 204 of the pipe a was enlarged, and wall thickness m was thickened. thus, by designing a wall of a pipe thickly, physical and chemical stability as a container of the pipe a itself can be improved, and various outer peripheral surface shape of the pipe a is boiled and processed, and improvement in operativity, etc. can be aimed at. Distinction with other things can also be aimed at as a pattern. That is, the annular recess 32 for establishing the finger type crevice 30 in a peripheral face of the pipe a, or the flange 31 of almost a disk type being engaged can be formed. Or slash-like unevenness and unevenness of other form can also be provided in a peripheral face of the pipe a. Finger type crevice or slash-like unevenness etc. may be provided also in a peripheral face of the pipe b. 74 expresses a screw thread.

[0029]Next, concentration medicine and a drug solution are manufactured in the pipes a and b by this invention, and a process assembled as one glass syringe is explained. Parts in contact with drugs, such as the pipe a, the pipe b, a rubber stopper, and each sealing plug, use altogether what passed through the high voltage above-mentioned sterilization or a gamma-ray-sterility process after desiccation except for a foreign matter by alkali cleaning, purified water washing, etc. beforehand. A synthetic resin raw material of a pipe body of the pipe a and the pipe b and construction material of a sealing plug choose a raw material which is equal to autoclave sterilization.

[0030]The process of manufacturing a liquid drug in the pipe b of this invention should just follow a process publicly known as this kind of a pharmaceutical preparation process conventionally. If it explains briefly, after capping the above-mentioned washing and the sterilized pipe b with the 2nd sealing plug 10, It is filled up with the liquid drugs 12, such as a solution, dispersion liquid, physiological saline liquid, and distilled water for injection, and after capping the 3rd sealing plug 11 under a vacuum so that air (oxygen) may not remain subsequently to in a pipe, autoclave sterilization (steam temperature of 125-130 **) is performed.

[0031]Next, the process of manufacturing concentration medicine, such as an antibiotic, an enzyme, a blood serum, a vaccine, protein, and a vitamin preparation, in the pipe a of this invention is explained. The tip opening of the glass syringe was closed with the rubber stopper and the cap, the concentration medicine which carried out sterile mixing from the back end side of a glass syringe in the sterile interior of a room was filled up with the method conventionally used widely, and it closed with this sealing plug after concentration. On the other hand, after filling up concentration medicine with the state where closed the back end side with the sealing plug, and the tip side was turned up so that it may explain with reference to drawing 12 in one example of the glass syringe a of this invention, it can condense from the tip side. Since the direction of the back end side has the large cross-section area, the position of an

injector is stable. namely, -- closing the open end of the pipe a with the 1st sealing plug, and turning the 1st sealing plug side down under the sterilization environment in a germfree room and a clean room etc., -- the **** drug solution of the tip opening 41 side to a raw material -- ** -- a fixed quantity is taught. As shown in drawing 12, the tip opening 41 of the pipe a is half-capped with rubber stopper S_1 which has the notch 43 and the annular projection 44 on this foot 42 with the leg 42, and cap C_4 is put on rubber stopper S_1. Since it has the slot 38 in this cap C_4 at the Kabeuchi side of the skirt part 37 of a cap, the projection 44 stops to the tip opening 41 in the state of half-capping, and the passage where the tip opening 41, the notching 43, and the slot 38 continue can be formed. The **** raw material drug solution in the pipe a evaporates under vacuum conditions, and the steam 39 is exhausted from this passage and serves as concentration medicine (freezing vacuum-drying medicine). If it becomes dry concentration medicine thoroughly, the graphic display arranged in ** (tub) of the same sterilization environment can seal concentration medicine very sanitarily in the pipe a by both capping and closing thoroughly rubber stopper S_1 and cap C_4 promptly with abridged capping equipment. Then, it assembles as an injector of one by screwing the pipe b which was filled up with the drug solution which mixes concentration medicine and dissolves according to a separated process, and was closed, and the pipe a obtained by the above.

[0032]In this invention, pharmaceutical preparation into the pipe a closes the tip side of the pipe a, is filled up with drugs from the back end side, and the 1st sealing plug can be changed into a half-capping state, and it can also condense it. Drawing 13 is a figure explaining the process of condensing thin drug solution 5' of the raw material with which it was filled up in the pipe a in the decompression tub room (or freeze-drying tub room) in other embodiments of this invention. Closing the tip of the main part 205 of the pipe a by rubber stopper S_2 and cap C_5, the back end has half-capped the 1st sealing plug 45.

[(b)] .(b) The bird's-eye view seen from the C-C' section of the portion to the arrow direction is shown in (**). The resin made film 47 is laminated in the field in contact with the drug solution of this rubber stopper S_2 and this 1st sealing plug 45, and concentration medicine. This 1st sealing plug 45 has the three ribs 48 in a sliding surface with the pipe 205. Only one of this rib 48 is put in in the pipe a back end, and a half-capping state can be maintained by stopping the 2nd rib into the portion of the screw 75 of the back end of the pipe a. Since this example has the two concave pits 49 along a cylinder axial direction in the symmetrical position of the internal surface of the screw thread 75 of backlash provided in the pipe a and this concave pit 49 can form a void between the walls of the pipe body 205 in the state of half-capping, the steam 39 of a drug solution is discharged considering this concave pit 49 as a passage. When it fully condensed and dries, it can close very sanitarily by capping the 1st sealing plug thoroughly as it is in the decompression tub interior of a room.

[0033]Drawing 14 is an outline sectional view of the screw thread 75 of the pipe a205 with which drawing 13 was manufactured, and an injector of this invention which had a drug solution manufactured separately and which was acceptable pipe b main part 905, and screwed and assembled the screw thread 85 of backlash. As for the 2nd sealing plug 105 at a tip of the pipe b main part 905, and the 3rd sealing plug 115 of the back end, the resin made film 47 is laminated by drug solution contact surface. Behind the 3rd sealing plug 115, it equipped with cap 15' further, and immobilization is strengthened. The pipe b905 has the crevice 30 in a wall by the side of the back end, and has strengthened engagement with cap

15'.

[0034]drawing 15 -- this invention -- being the further -- others -- it is a figure explaining a process of condensing thin drug solution 5' of a raw material with which it was filled up in the pipe a in a decompression tub room (or freeze-drying tub room) in an embodiment. Closing a tip which has the rib R of the main part 206 of the pipe a by rubber stopper S_3 and cap C_6, the back end has half-capped the 1st sealing plug 46. [(b)] .(b) A bird's-eye view seen from a D-D' section of a portion to an arrow direction is shown in (**). This 1st sealing plug 46 has the three ribs 48 in a sliding surface with the pipe 206, puts in only one of this rib 48 in the pipe a206 back end, and is maintaining a half-capping state by stopping the 2nd rib into a portion of the screw thread 76 of backlash of the back end of the pipe a206. This example turns off and lacks the screw thread 76 of the pipe a towards a cylinder axial direction at two places in a symmetric position from an open end part, and can form a passage larger than a case of drawing 13 between walls of the pipe body 206 in the state of half-capping. The steam 39 of a drug solution is discharged considering this notch 49' as a passage. When it fully condensed and dries, it can close very sanitarily by capping the 1st sealing plug 46 thoroughly as it is in the decompression tub interior of a room. 6' is discontinuity.

[0035]Drawing 16 is an outline sectional view of the screw thread 76 of the pipe a206 with which drawing 15 was manufactured, and an injector of this invention which had a drug solution manufactured separately and which was acceptable pipe b906, made the packing 29 intervene, screwed the screw thread 86 of backlash, and assembled it. As for the 2nd sealing plug 106 at a tip of the pipe b906, and the 3rd sealing plug 116 of the back end, the resin made film 47 is laminated by drug solution contact surface. Behind the 3rd sealing plug 116, it equipped with cap 15" further, and immobilization is strengthened. The pipe b906 has a projection in a wall by the side of the back end, and has strengthened engagement with cap 15". It is preferred to also perform a joint process of the above-mentioned pipe a206 and the pipe b906 within the Klin room. Since this invention can carry out a joint process simply and certainly, it is advantageous on a process of operation.

[0036]Although a graphic display was omitted, in an embodiment of further others of this invention, drawing 13 and the same operation effect as an example of drawing 15 can be obtained by providing a hole near the releasing part of the back end of the pipe a.

[0037]Next, structure of a point which is a hypodermic needle attachment side of the pipe a of an injector of this invention is explained. In an embodiment of drawing 10, a projection is provided in a peripheral face of a tip opening of the pipe a, and a graphic display provides an annular recess which engages with this projection in a wall of an abridged rubber stopper, and has ensured seal at a tip. In one example of this invention shown in drawing 15 and drawing 16, it has tubed color C_7 projected from the main part 206 on a periphery of a tip opening of the pipe a, and, as for this color C_7, the two ribs R are formed in an internal surface. A hub hypodermic needle group with a flange is easily fixable in this color C_7. A tip opening of this pipe a is sealed by rubber stopper S_3, and this rubber stopper S_3 is being fixed by cap C_6.

[0038]A hygroscopic size which this invention injector could suit a size range where small capacity of 0.2-1 ml to about 50 ml of large scale is wide, and was moreover stored in a mass pipe aimed at realizing a mothball of three to five years also about an easy-oxidizable unstable medicine. For this purpose,

coexistence of a sealing plug with the 1st, 2nd, and 3rd expensive sealing plug (it is also named a piston generically below) of this invention and slidability is required. As construction material of this piston, it is with a JIS hardness of about 30 comparatively soft construction material, for example, and a rubber elastomer of about 10% of the amount of compressive strains, etc. are preferred at a heating rubber elastomer which has heat resistance and does not have a compressive strain, for example, 100 **. What provided three or more annular ribs in a sliding portion with an inner wall of cylinder as form of a sealing plug is preferred. In addition, it is desirable to apply known art in this kind of field to the highest degree.

[0039]Drawing 17 is an outline sectional view showing one embodiment of completion products which packed an injector of this invention. The drug solution 12 accommodated the concentration medicine 5 in the pipe b in the pipe a, and each is sealed with rubber stopper 3', 1st sealing plug 4', the 2nd sealing plug 10, and the 3rd sealing plug 11. By [which ****, ****s with 7 and screws 8] having been formed in an end, this pipe a and the pipe b carry out joint unification firmly, and are making one cylindrical shape without unevenness. An injector of manufactured this invention is put into the packed body 34 as shown, for example in drawing 17, arranges the rubber cushion 35, and seals it with the rubber stopper 36. Thereby, it can protect from vibration by conveyance. This form is simple for a package of the whole container.

[0040]Pusher bar 18' serves as a stowage container of the hypodermic needle (double ended needle) 33 of both the heads in the embodiment of drawing 17, and it at the time of use. After it stuffs into an inside of the pipe b pusher bar 18' which is engaging with the 3rd sealing plug 11, and the liquid drug 12 is mixed [the concentration medicine 5 and] and all carries out the end of a move, screwing of the pipe a and the pipe b is canceled and both are separated. next -- taking out the double ended needle 33 from pusher bar 18' -- tip rubber stopper 3' -- a puncture -- it penetrates and a drug solution is prescribed for the patient by making double ended needle 33 inside into a passage. If said pusher bar 18' is the length of the pipe b or the pipe a, it will take effect enough. Thus, if a two-room joint type is used, pusher bar length will be shorter than before, and will become good.

[0041]If there being less a gap of a connecting part and unevenness conventionally than elegance since it is screwing, and an outer diameter adopt a container of the same size, since unevenness forms few one cylindrical body on the whole, a gap with a container can also be packed compactly small and that of an injector of this invention is convenient to carry. Abundance of oxidation promoting agent, such as air with a possibility of invading in an injector, can also be reduced, and it is so effective in quality maintenance of medicine that there are few gaps between packed bodies.

[0042]since it is also possible for combination of the pipe a and the pipe b to be easy, and to dissociate, this invention boils various combination of the medicine in the pipe a, and the liquid drug of the pipe b, and can change. For example, the anticancer drug or the antibiotic is manufactured in the pipe a, the liquid drug of the pipe b is combining distilled water for injection or a physiological saline etc., and is simple for a manufacturing process as compared with the type which divides one room, and an efficient thing cannot be overemphasized. In this case, the pipe a and the pipe b can also be used as a product with the form which can be chosen separately. It can respond also to the case which a medical practitioner etc. want to choose and medicate with combination, and is suitable for a research use etc.

[0043]The construction material which constitutes the injector of this invention of the above structures is explained below. Although the safety to the human body as an injector and chemical resistance are indispensable requirements, this invention, It is necessary to choose the construction material which can

be saved airtightly enough without receiving the influence from environment, such as air (oxygen), moisture (humidity), and temperature, also to which medicine with which a physical characteristic, chemical property, and stability furthermore differ from the susceptibility over an environmental condition as mentioned above as a medicine container. It is as having already explained the piston. As a material of the package body (pipe) of the injector of this invention, although glass, a synthetic resin, etc. are mentioned, Since it joins together by screwing, it is indispensable to form a screw thread in precise form, When a moldability is also taken into consideration, a synthetic resin is preferred, for example, one or more sorts, such as the resin which uses a cyclic olefin system compound or a bridge construction polynuclear hydrocarbon compound as a polymer component, polyethylene, polypropylene, polycarbonate, a polymethyl pentene, and polyester resin, can be used. It is also preferred to laminate two or more sorts of materials. What furthermore vapor-deposited a silicon oxide and magnesium oxide on the synthetic resin surface is preferred. Shaping of a synthetic resin and the processing can use all of the publicly known technology in this seed technical field. Known art is applied also to a hypodermic needle portion.

[0044]As a packed body material of this invention, material which laminated polyester, polysulfone, polyarylate, denaturation phenylene oxide resin, polyamide, poly vinyl alcohol, polyvinyl acetate, etc. mutually at 3-5 layers, for example is mentioned. What vapor-deposited a silicon oxide, an aluminum oxide, magnesium oxide, etc. on the above-mentioned laminated plastic surface is preferred in order to hold and carry out the mothball of the quality of drugs with which there is a barrier operation on oxygen, air, and moisture (humidity), and it filled up in an injector.

[0045]

[Effect of the Invention]This invention is a syringe cum container which combines in series two containers respectively filled up with medicine by screwing of the screw screwed on the container itself, and the effect is as follows.

(1) Since it fits in by a thread part directly, combine two cylindrical body containers powerfully with small volume, and separation of a cylindrical body is also easy.

(2) since it joined together physically with the screw formed in the container itself and there were no necessities, such as adhesives and hot welding, the danger of the advantageous debasement according to heat, adhesives, etc. in addition has been canceled on the pharmaceutical preparation process.

(3) Since it is combination with a screw, the size of two containers and wall thickness can be adjusted arbitrarily, and suitable combination can be chosen according to the pharmaceutical preparation process of the medicine with which an inside is filled up, and dosage forms.

(4) The inside diameter of the body cylinder of the container a filled up with concentration medicine can be prescribed for the patient by **** smaller than the inside diameter of the container b in the thing of the type made thick a little.

(5) Since container size is combinable suitably, to the concentration medicine specified, for example, various kinds of liquid drug and sizes are manufactured easily, and the thing of combination which changed ** can also use them.

(6) Since two sorts of medicine can be manufactured independently, a manufacturing process is simplified.

(7) Since a pusher bar portion can also be conventionally shortened with elegance compared with the conventional division type injector in addition to being a container of small volume, a large quantity can be conventionally processed from elegance in one batch, and the improvement in manufacturing

efficiency and a cost fall can be realized.
(8) The container a and the container b have structure intercepted airtightly thoroughly, and since a liquid drug can be prevented from influencing preservation of concentration medicine, the high quality stable over the long period of time can be guaranteed.
(9) An injector is collected small, becomes simple [a package] and is convenient to carry.
(10) If waste treatment makes all of a package body, a rubber stopper, a sealing plug, a pusher bar, injection, a packed body needle, etc. the easy product made of a synthetic resin, an environmental protection problem can also be coped with.

[Translation done.]

* NOTICES *

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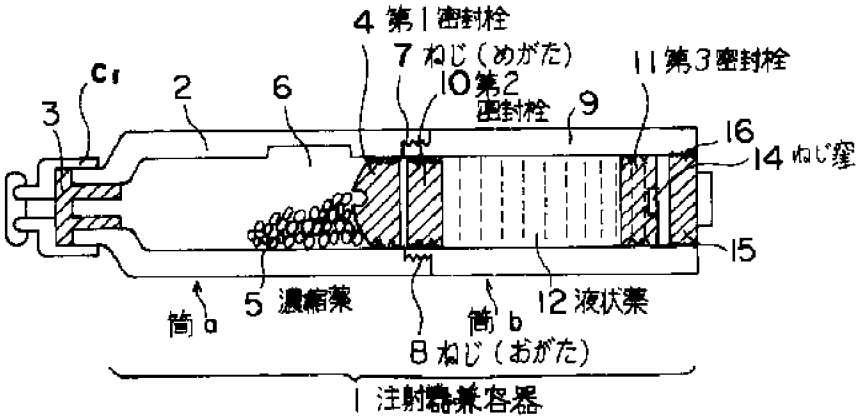
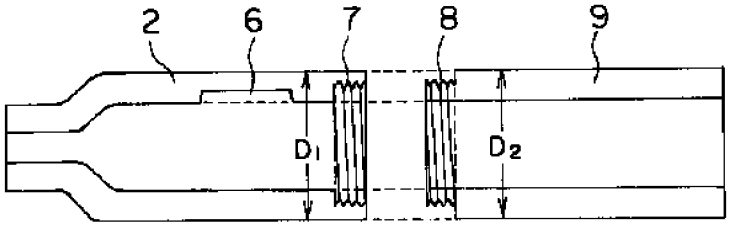
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

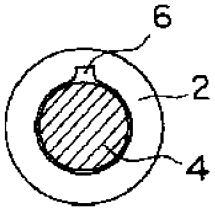
[Drawing 1]



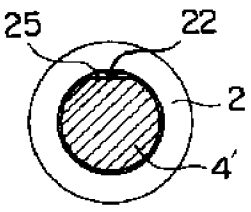
[Drawing 2]



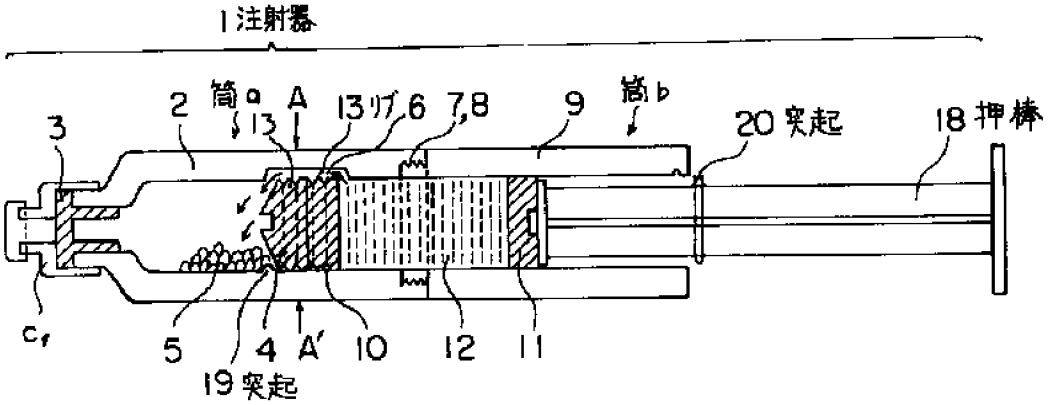
[Drawing 4]



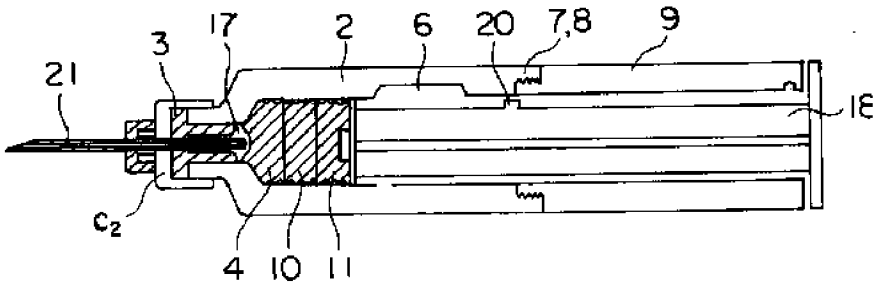
[Drawing 7]



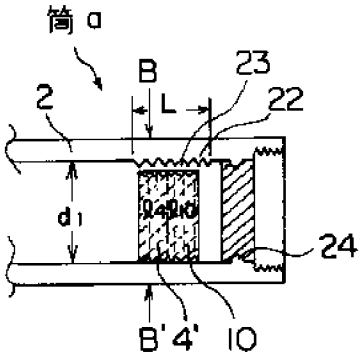
[Drawing 3]



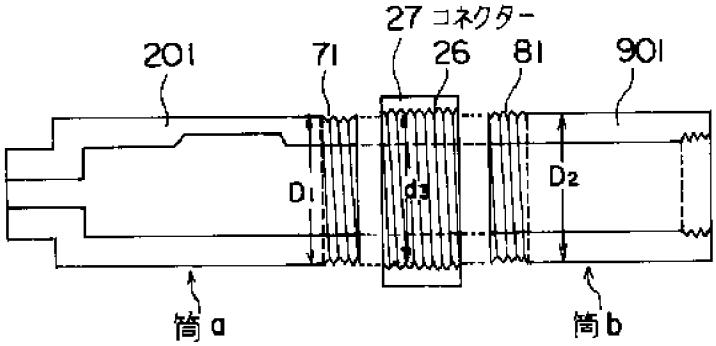
[Drawing 5]



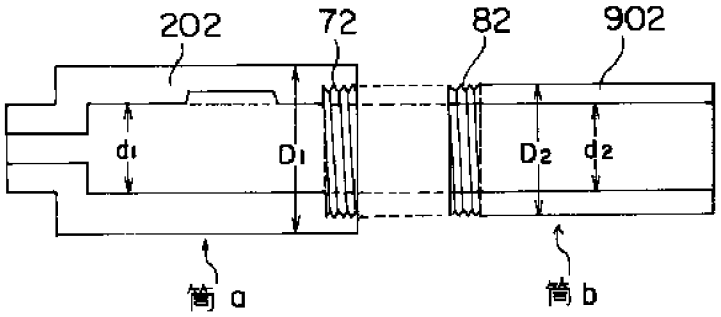
[Drawing 6]



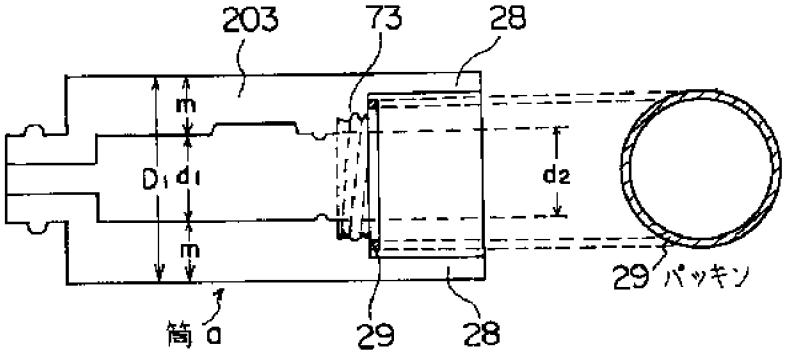
[Drawing 8]



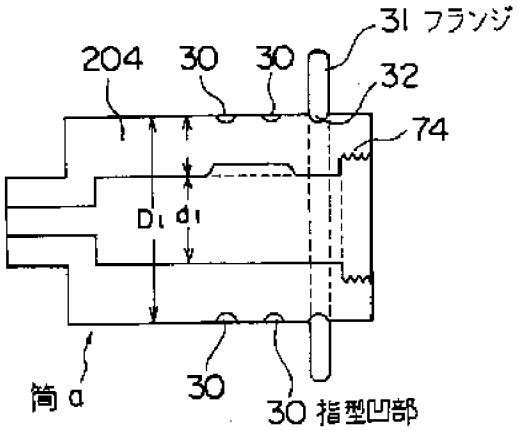
[Drawing 9]



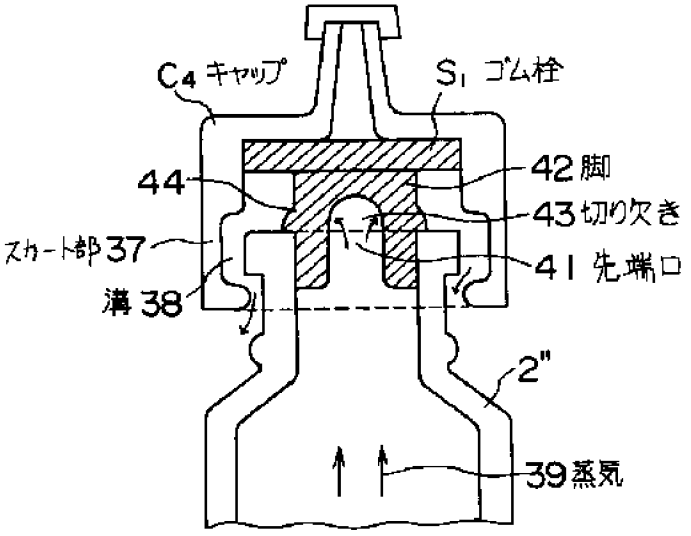
[Drawing 10]



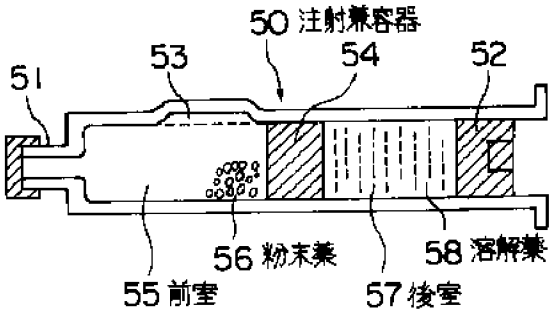
[Drawing 11]



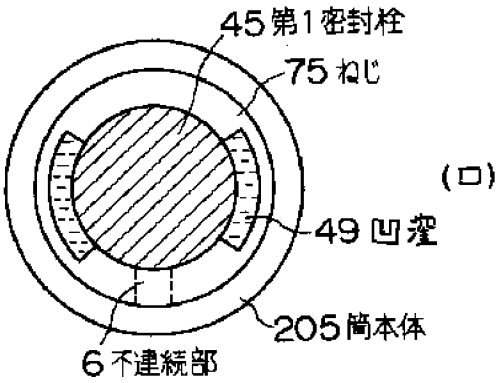
[Drawing 12]

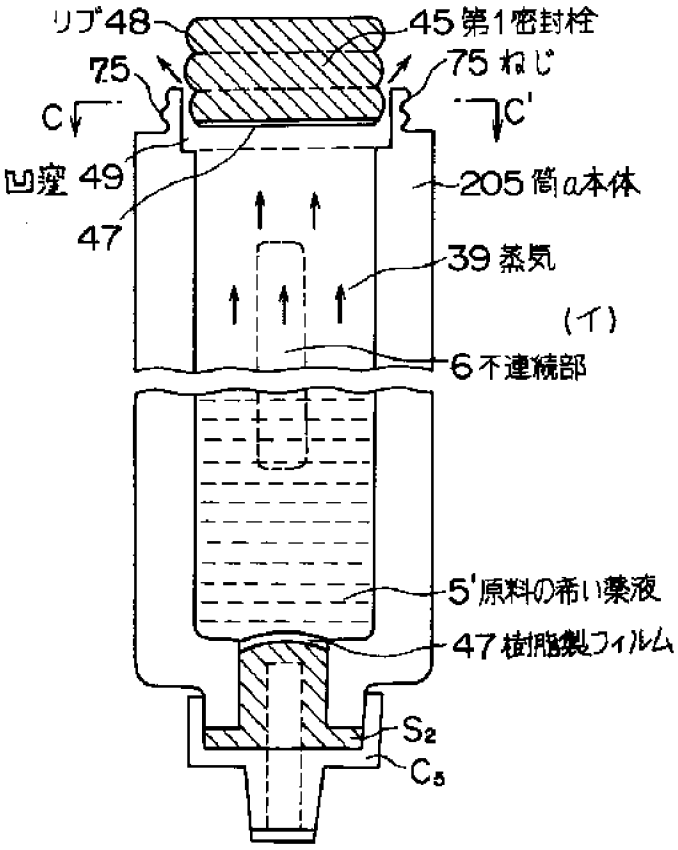


[Drawing 18]

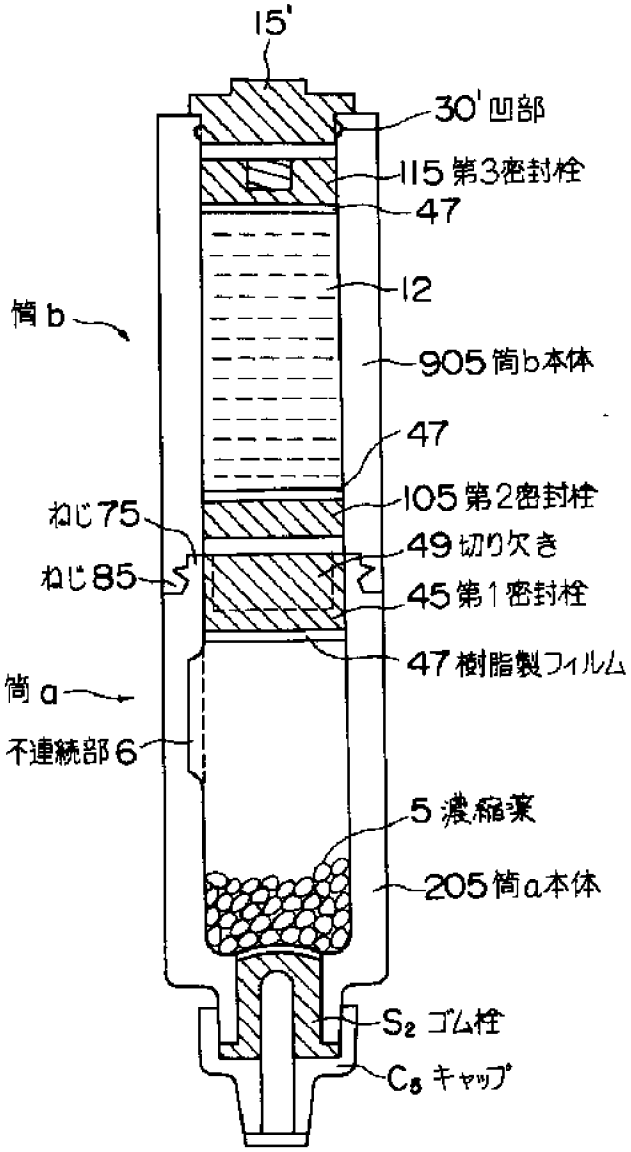


[Drawing 13]

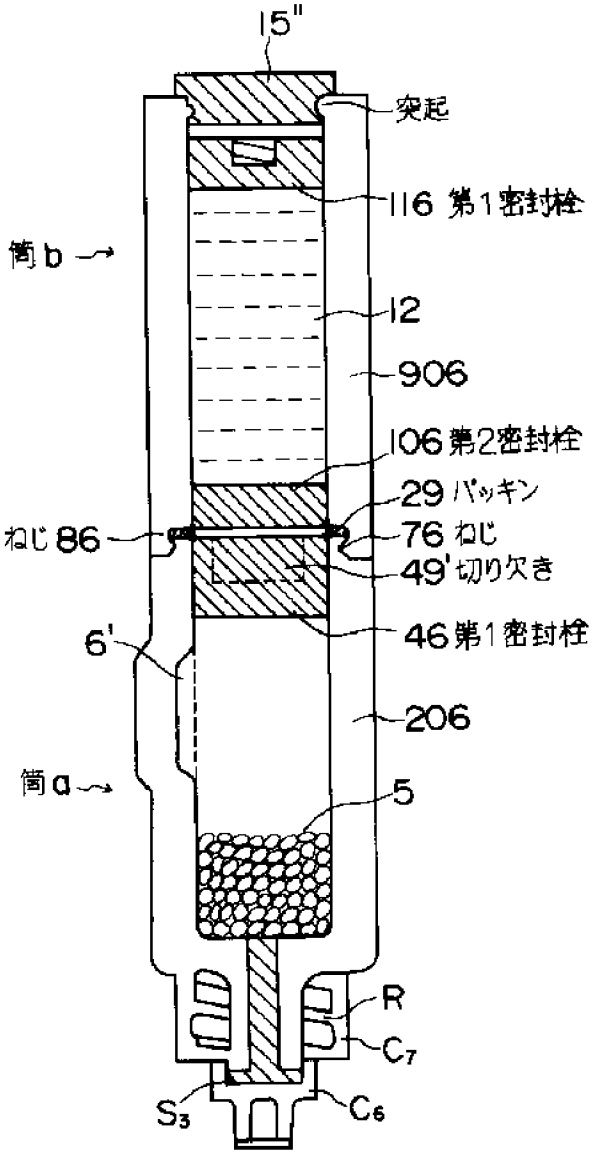




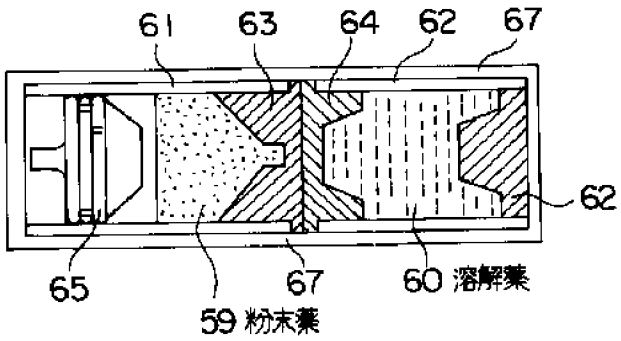
[Drawing 14]


15'
30' 凹部
115 第3密封栓
47
12
筒 b
905 筒b本体
47
105 第2密封栓
ねじ75
49 切り欠き
ねじ85
45 第1密封栓
47 樹脂製フィルム
筒 a
不連続部6
5 濃縮菜
205 筒a本体
S2 ゴム栓
C5 キャップ

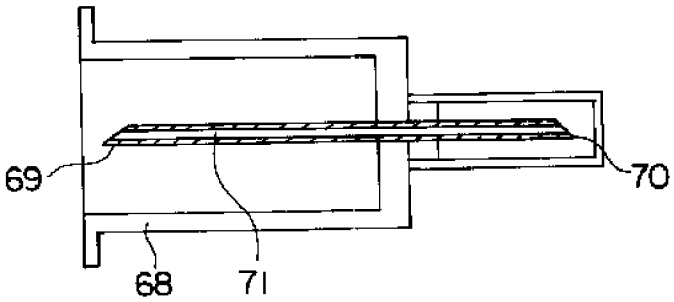
[Drawing 16]



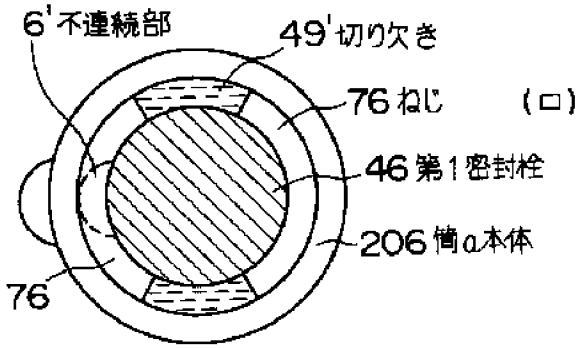
[Drawing 19]

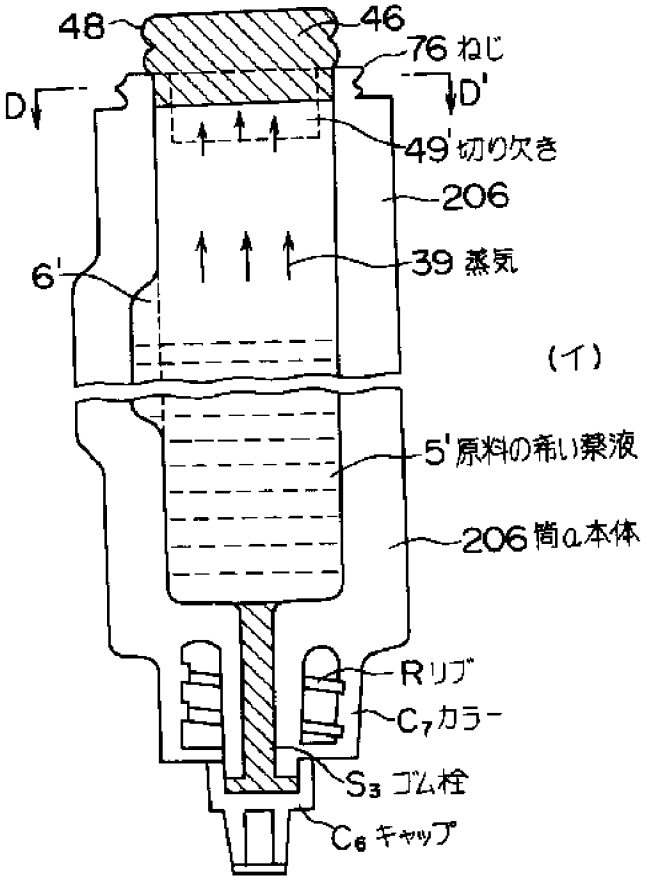


[Drawing 20]

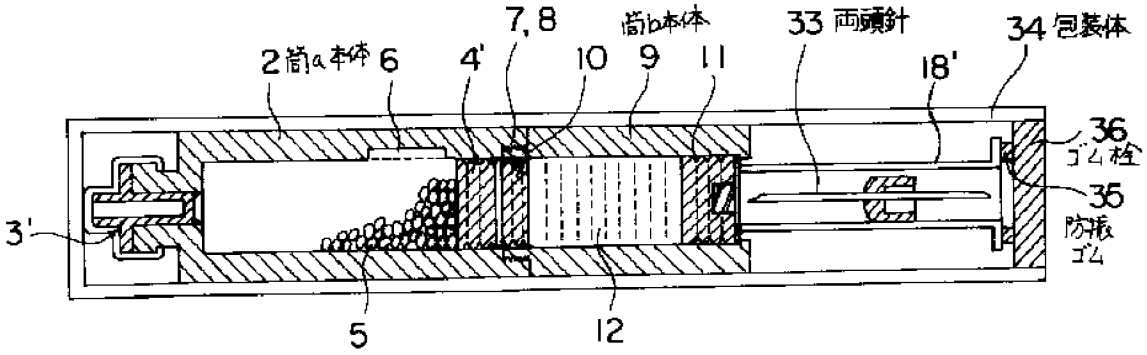


[Drawing 15]





[Drawing 17]



[Translation done.]

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(71)出願人　000149000
株式会社大協精工
東京都墨田区墨田３丁目38番２号

(72)発明者　杉原　茂
埼玉県浦和市中尾2539番地

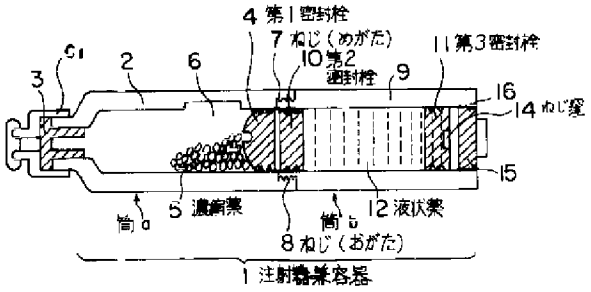
(74)代理人　弁理士　内田　明　（外２名）

(54)【発明の名称】　２室を結合した注射器

(57)【要約】　（修正有）

【課題】２容器の結合が強固で密封性が高く、分離も簡単であり、容器容積を低減し、製造工程が簡略で効率良く製造できる注射器兼容器を提供。

【解決手段】注射針、略円筒状の第１の容器ａ、略円筒状の第２の容器ｂ及び押棒からなり、該容器ａの該第１密封栓で封止された後端開放部と、該容器ｂの第２密封栓で封止された先端開口部を気密に密着して該容器ａと該容器ｂが一体に結合されており、用時には容器ｂの結合部とは反対の端部を封止する第３密封栓に押棒を取り付けて容器ｂ内に押し込み第１密封栓及び該第２密封栓を容器ａ内壁に設けた不連続部まで移動し、該容器ｂ内の該液状薬が該通路を経由して該容器ａ内に流入し、該濃縮薬と混和して注射薬となる注射器において、容器ａと容器ｂの結合が、容器ａの後端開放部壁面に螺設したねじと、容器ｂの先端開口部壁面に螺設したねじの螺合による。



【特許請求の範囲】

【請求項１】　(1)注射針部、(2)略円筒状の第１の円筒体の先端側開口部を注射針部取り付け部分とし、該先端開口部は注射針取り付け用ゴム栓で気密に封止し、後端の開放部は第１密封栓で封止して、円筒体の内壁表面には筒軸方向に沿って延びる不連続部を設けてあり、該円筒体内の該注射針取り付け用ゴム栓及び該第１密封栓により形成される室内に濃縮薬を充填された容器ａ、(3)第２の円筒体の先端側開口部を第２密封栓で封止し、他の開放端部は第３密封栓で封止し、該第２の円筒体内の該第２密封栓及び第３密封栓により形成される室内に液状薬を充填されてなる容器ｂ、(4)上記第３密封栓の後部の窪に取り付けられる押棒、の(1)～(4)を有してなり、該容器ａの該第１密封栓で封止された後端開放部と、該容器ｂの第２密封栓で封止された先端開口部を気密に密着して該容器ａと該容器ｂが一体に結合されており、使用時には該第３密封栓の該窪に該押棒を取り付けて該第３密封栓を該容器ｂ内に押し込むことにより該第１密封栓及び該第２密封栓を該不連続部まで移動し、該不連続部の筒軸方向長さは上記第１密封栓の筒軸方向長さと上記第２密封栓の筒軸方向長さの和より長く設定してあるために該不連続部が該容器ａ内と該容器ｂ内を連通する通路を形成し、該容器ｂ内の該液状薬が該通路を経由して該容器ａ内に流入し、該濃縮薬と混和して注射薬となる注射器において、上記該容器ａと該容器ｂの結合が、該容器ａの後端開放部壁面に螺設したねじと、該容器ｂの先端開口部壁面に螺設したねじの螺合によることを特徴とする２室を結合した注射器。

【請求項２】　上記容器ａのねじは後端部の内周壁面に螺設されためねじであり、上記容器ｂのねじは先端開口部の外周壁面に螺設されたおねじであることを特徴とする請求項１記載の２室を結合した注射器。

【請求項３】　(1)注射針部、(2)略円筒状の第１の円筒体の先端側開口部を注射針部取り付け部分とし、該先端開口部は注射針取り付け用ゴム栓で気密に封止し、後端の開放部は第１密封栓で封止して、円筒体の内壁表面には筒軸方向に沿って延びる不連続部を設けてあり、該円筒体内の該注射針取り付け用ゴム栓及び該第１密封栓により形成される室内に濃縮薬を充填された容器ａ、(3)第２の円筒体の先端側開口部を第２密封栓で封止し、他の開放端部は第３密封栓で封止し、該第２の円筒体内の該第２密封栓及び第３密封栓により形成される室内に液状薬を充填されてなる容器ｂ、(4)上記第３密封栓の後部の窪に取り付けられる押棒、の(1)～(4)を有してなり、該容器ａの該第１密封栓で封止された後端開放部と、該容器ｂの第２密封栓で封止された先端開口部を気密に密着して該容器ａと該容器ｂが一体に結合されており、使用時には該第３密封栓の該窪に該押棒を取り付けて該第３密封栓を該容器ｂ内に押し込むことにより該第１密封栓及び該第２密封栓を該不連続部まで移動し、該不連続部の筒軸方向長さは上記第１密封栓の筒軸方向長さと上記第２密封栓の筒軸方向長さの和より長く設定してあるために該不連続部が該容器ａ内と該容器ｂ内を連通する通路を形成し、該容器ｂ内の該液状薬が該通路を経由して該容器ａ内に流入し、該濃縮薬と混和して注射薬となる注射器において、該容器ａと該容器ｂの結合が、該容器ａの後端開放部壁面に螺設したねじと、該容器ｂの先端開口部壁面に螺設したねじの螺合によるものであり、かつ該容器ａの後端の開放端部から筒軸方向に向かう切欠き又は凹窪を１個以上有することを特徴とする２室を結合した注射器。

【請求項４】　該容器ａのねじは後端部の外周壁面に螺設されたおねじであり、該容器ｂのねじは先端開口部の内周壁面に螺設されためねじであることを特徴とする請求項１又は請求項３記載の２室を結合した注射器。

【請求項５】　(1)注射針部、(2)略円筒状の第１の円筒体の先端側開口部を注射針部取り付け部分とし、該先端開口部は注射針取り付け用ゴム栓で気密に封止し、後端の開放部は第１密封栓で封止して、円筒体の内壁表面には筒軸方向に沿って延びる不連続部を設けてあり、該円筒体内に該ゴム栓及び該第１密封栓により形成される室内に濃縮薬を充填された容器ａ、(3)第２の円筒体の先端側開口部を第２密封栓で封止し、他の開放端部は第３密封栓で封止し、該第２の円筒体と該第２密封栓及び第３密封栓により形成される室内に液状薬を充填されてなる容器ｂ、(4)上記第３密封栓の後部の窪に取り付けられる押棒、の(1)～(4)を有してなり、該容器ａの該第１密封栓で封止された後端開放部と、該容器ｂの第２密封栓で封止された先端開口部を気密に密着して該容器ａと該容器ｂが一体に結合されており、使用時には該第３密封栓の該窪に該押棒を取り付けて該第３密封栓を該容器ｂ内に押し込むことにより該第１密封栓及び該第２密封栓を該不連続部まで移動し、該不連続部の筒軸方向長さは上記第１密封栓の筒軸方向長さと上記第２密封栓の筒軸方向長さの和より長く設定してあるために該不連続部が該容器ａ内と該容器ｂ内を連通する通路を形成し、該容器ｂ内の該液状薬が該通路を経由して該容器ａ内に流入し、該濃縮薬と混和して注射薬となる注射器において、上記該容器ａと該容器ｂの結合が、容器ａの後端開放部外周壁面に螺設したねじと、容器ｂの先端開口部外周壁面に螺設したねじを、該容器ａ，該容器ｂの外径より大きい内径を有する筒状のコネクターの内周壁面に螺設したねじとそれぞれ螺合することによることを特徴とする２室を結合した注射器。

【請求項６】　上記容器ａ本体の外径が上記容器ｂ本体の外径と実質的に等しく、上記容器ａ本体の内径が上記容器ｂ本体の内径と実質的に等しいか又は若干大きいものであることを特徴とする請求項１ないし請求項５のいずれかに記載の２室を結合した注射器。

【請求項７】　上記容器ａ本体の内径が上記容器ｂ本体

の内径より大きいものであることを特徴とする請求項１ないし請求項６のいずれかに記載の２室を結合した注射器。

【請求項８】　上記容器ａ本体の壁厚さと上記容器ｂ本体の壁厚さは等しいか又は一方が他方より厚いものであることを特徴とする請求項１ないし請求項７のいずれかに記載の２室を結合した注射器。

【請求項９】　ねじの回転が３０°～３６０°で上記容器ａと上記容器ｂ強固に結合できるように該容器ａのねじと該容器ｂのねじのピッチを広くしたことを特徴とする請求項１ないし請求項８のいずれかに記載の２室を結合した注射器。

【請求項１０】　上記不連続体が筒軸方向に沿って設けた凹状溝であることを特徴とする請求項１ないし請求項９のいずれかに記載の２室を結合した注射器。

【請求項１１】　上記不連続体が筒軸方向に沿って一列に周期的に並ぶ断面三角形の山部と谷部からなることを特徴とする請求項１ないし請求項１０のいずれかに記載の２室を結合した注射器。

【請求項１２】　上記容器ａの先端開口部を封止するゴム栓が、脚部を有し、該脚部には切り欠きと、外周面に環状突起を設けてあり、該ゴム栓にはスカート部に切り欠きを有し天面には突出した円筒状の管部を有するキャップを被せ、該キャップを被せたゴム栓を容器ａの先端開口部に半打栓状態で係止させることにより、容器ａ内部とゴム栓の切り欠き及びキャップの切り欠きが連通した通路を形成できるものであることを特徴とする請求項１ないし請求項１１のいずれかに記載の２室を結合した注射器。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は２室を結合した注射器に関し、詳しくは該注射器の各室内にはそれぞれ規定量の薬品を安定に保存し、投与の際は両容器内を連通させ一方の室の薬品を他の室に移動させることにより両者を混合して投与可能な注射液とするタイプの注射器の改良に関する。

【０００２】

【従来の技術】注射器の筒の内部に薬剤（薬液）を収納して保存しておけるキット製品は、緊急時に速やかに衛生的に投与できる注射器として知られており、プレフィルドディスポーザブル　シリンジ（ Pre filled disposable syring ）と呼称されている。一方注射液として溶液状態での保存が不安定な薬品は、一般に凍結乾燥等の処理により粉末の薬剤としておき、使用時に溶解液と混和して注射液とした後、直ちに投与されるが、緊急を要することもある使用時での混和操作は煩雑で汚染の危険がある。そこで注射筒を二室に分割してそれぞれの室内に予め粉末薬剤と溶解液を分離して充填，保存しておき、使用時に二室を連通して注射液を生成できる二室式の容器兼注射器製剤が開発され、操作の簡便性，確実性と衛生的な迅速投与が可能等の利点を有するため、使用者に喜ばれその使用量も増大しつつある。

【０００３】図１８は従来品の一例の概略断面図であり、注射器兼容器５０（筒と略す）の先端部５１は注射針が装着できるように筒５０の本体部分より外径が細くなって管状に突出した構造をしており、他の開放端には押棒を係合できる滑栓５２を密に嵌入してある。また、筒５０のほぼ中央の外周に突出する注入溝５３を設け、注入溝５３より開放端側の位置に筒５０内を摺動可能な滑栓５４を設けて筒５０内を前後二室に分離し、前室５５には粉末薬を、後室５７には溶解液を充填している。このような製剤は、前室５５に粉末薬５６を直接充填した後滑栓５４を筒内に挿入して前室内を密封し、次いで後室５７には溶解液５８を充填した後滑栓５２で開放部を密封して製造する。使用時には、滑栓５２の後方に押棒を取り付けてこれで該滑栓５２を後室内に押し込み、押圧をかけられた滑栓５４が注入溝５３に達すると、該滑栓５４の長さは注入溝５３の長さより短く設計されているので両室が連通し、溶解液５８は前室５５内に流入して粉末薬５６と混和し注射液となる。注射針を先端部５１に取り付けることにより直ちに投与可能となる。このような一つの注射筒内を密封栓（滑栓）等により二室に分割した構造の容器兼注射器（以下「分割式容器兼注射器」と略記する場合もある）としては、例えば実公昭４９－１４４６５に記載のものが挙げられる。

【０００４】また、上記の注入溝の代わりに、注射筒の内壁に針を接着しておき、使用時に二室を分離している滑栓を摺動すると該滑栓が該針に刺通され、該針内部を通路となって二室が連通される容器兼注射器が実公昭５４－２２３１５号に提案されている。このような分割式容器兼注射器の更なる改良として、特開昭５８－４１５６８号、特開昭６１－４８３７７号、特開昭６２－１４８６３号、特開昭６２－１１７５６６号、特開昭６２－２７０１６９号、特開昭６４－８０３７１号、特開平２－５９７３号、特開平３－８２４７６号、特開平６－５４９０８号などが提案されている。

【０００５】一方特開昭５１－１１６９１号、米国特許明細書第４０３１８９２号には、図１９に示すように、ガラス製の小型容器６１内には粉末薬５９を充填して容器両端をフランジ付きゴム栓６３と滑栓６５で密封し、容器６２内には希釈薬６０を充填してフランジ付きゴム栓６４及びゴム栓６６で密封し、両容器をプラスチック包装体６７で一体にした、二容器結合型の注射器兼容器が提案されている。投与の際には図２０に示すホルダー６８に小型容器６１、６２をはめ込み、ホルダーに固定された注射針６９でゴム栓６２、フランジ付ゴム栓６４、６３を順次穿刺、貫通してゆく。注射針６９の針先が粉末薬５９に達すると、希釈薬６０は注射針６９の中程の開口７１より注射針内を経由して容器６１内に流入

し、粉末薬５９と混和、溶解して薬液となる。注射液投与には、滑栓６５に押棒を付けて押すと、薬液は注射針６９内を通って、注射針７０から流出できる。

【０００６】このように、二つの小容器（室）を連結したタイプの注射器は、凍結乾燥等を要する薬品と溶解液等を別容器内に充填、製剤できるので、製剤工程等における作業性が高く、また一つの容器サイズが小さいため分割タイプよりも一度に処理できる数が多くなり、有利である。さらなる改良として、特開平４－３５４９５４号、特開平５－３１１９１号、特開平６－７４４６号、特開平６－１４２２０３号、特開平７－１３６２６７、特開平７－１３６２６４号、特開平７－１４８２６１号、実開平５－１５２、実開平５－８６３５３、実開平６－１３８３２号などに記載される提案がある。

【０００７】

【発明が解決しようとする課題】上記従来技術では依然として、注射器への薬剤充填には複雑な作業工程を要するに加え、加熱滅菌による薬剤力価の低下など品質保持上の問題があり、さらには滅菌工程の簡素化、製剤装置と薬剤コスト低減による商品価格の低減等、解決すべき問題が多々残っている。本発明はこのような現状に鑑み、二室を結合した注射器のさらなる改良を目的とし、二種類の薬品を別容器に保存することにより特に不安定な薬や力価保持の必要のある薬品の安定性をより高度に保つことができること、使用に際してはより簡単な操作で両薬品を混合できてただちに衛生的に投与できること、製剤工程においては滅菌が簡単に操作できること、滅菌下クリーンルーム内で衛生的に高度な製剤技術をしかも簡単に適用できる構造とすること、等の要求を満足できて現在の医薬品に求められている高性能、高品質な注射器兼容器を提供することを課題とするものである。

【０００８】

【課題を解決するための手段】上記課題を解決するための手段として本発明は、〔１〕(1)注射針部、(2)略円筒状の第１の円筒体の先端側開口部を注射針部取り付け部分とし、該先端開口部は注射針取り付け用ゴム栓で気密に封止し、後端の開放部は第１密封栓で封止して、円筒体の内壁表面には筒軸方向に沿って延びる不連続部を設けてあり、該円筒体内の該注射針取り付け用ゴム栓及び該第１密封栓により形成される室内に濃縮薬を充填された容器ａ、(3)第２の円筒体の先端側開口部を第２密封栓で封止し、他の開放端部は第３密封栓で封止し、該第２の円筒体内の該第２密封栓及び第３密封栓により形成される室内に液状薬を充填されてなる容器ｂ、(4)上記第３密封栓の後部の窪に取り付けられる押棒、の(1)～(4)を有してなり、該容器ａの該第１密封栓で封止された後端開放部と、該容器ｂの第２密封栓で封止された先端開口部を気密に密着して該容器ａと該容器ｂが一体に結合されており、使用時には該第３密封栓の該窪に該押棒を取り付けて該第３密封栓を該容器ｂ内に押し込むことにより該第１密封栓及び該第２密封栓を該不連続部まで移動し、該不連続部の筒軸方向長さは上記第１密封栓の筒軸方向長さと上記第２密封栓の筒軸方向長さの和より長く設定してあるために該不連続部が該容器ａ内と該容器ｂ内を連通する通路を形成し、該容器ｂ内の該液状薬が該通路を経由して該容器ａ内に流入し、該濃縮薬と混和して注射薬となる注射器において、上記該容器ａと該容器ｂの結合が、該容器ａの後端開放部壁面に螺設したねじと、該容器ｂの先端開口部壁面に螺設したねじの螺合によることを特徴とする２室を結合した注射器注射器を提供する。本発明の特に好ましい実施態様として、該容器ａのねじは後端部の内周壁面に螺設されためねじであり、該容器ｂのねじは先端開口部の外周壁面に螺設されたおねじであることを特徴とする上記〔１〕記載の注射器が挙げられる。また本発明は、〔２〕(1)注射針部、(2)略円筒状の第１の円筒体の先端側開口部を注射針部取り付け部分とし、該先端開口部は注射針取り付け用ゴム栓で気密に封止し、後端の開放部は第１密封栓で封止して、円筒体の内壁表面には筒軸方向に沿って延びる不連続部を設けてあり、該円筒体内の該注射針取り付け用ゴム栓及び該第１密封栓により形成される室内に濃縮薬を充填された容器ａ、(3)第２の円筒体の先端側開口部を第２密封栓で封止し、他の開放端部は第３密封栓で封止し、該第２の円筒体内の該第２密封栓及び第３密封栓により形成される室内に液状薬を充填されてなる容器ｂ、(4)上記第３密封栓の後部の窪に取り付けられる押棒、の(1)～(4)を有してなり、該容器ａの該第１密封栓で封止された後端開放部と、該容器ｂの第２密封栓で封止された先端開口部を気密に密着して該容器ａと該容器ｂが一体に結合されており、使用時には該第３密封栓の該窪に該押棒を取り付けて該第３密封栓を該容器ｂ内に押し込むことにより該第１密封栓及び該第２密封栓を該不連続部まで移動し、該不連続部の筒軸方向長さは上記第１密封栓の筒軸方向長さと上記第２密封栓の筒軸方向長さの和より長く設定してあるために該不連続部が該容器ａ内と該容器ｂ内を連通する通路を形成し、該容器ｂ内の該液状薬が該通路を経由して該容器ａ内に流入し、該濃縮薬と混和して注射薬となる注射器において、該容器ａと該容器ｂの結合が、該容器ａの後端開放部壁面に螺設したねじと、該容器ｂの先端開口部壁面に螺設したねじの螺合によるものであり、かつ該容器ａの後端の開放端部から筒軸方向に向かう切欠き又は凹窪を１個以上有することを特徴とする２室を結合した注射器を提供する。本発明の特に好ましい実施態様として、該容器ａのねじは後端部の外周壁面に螺設されたおねじであり、該容器ｂのねじは先端開口部の内周壁面に螺設されためねじであることを特徴とする請求項１又は請求項３記載の２室を結合した注射器ことを特徴とする上記〔１〕又は〔２〕記載の注射器が挙げられる。さらに本発明は、〔３〕(1)注射針部、(2)略円筒状の第１の円

筒体の先端側開口部を注射針部取り付け部分とし、該先端開口部は注射針取り付け用ゴム栓で気密に封止し、後端の開放部は第１密封栓で封止して、円筒体の内壁表面には筒軸方向に沿って延びる不連続部を設けてあり、該円筒体内に該ゴム栓及び該第１密封栓により形成される室内に濃縮薬を充填された容器ａ、(3)第２の円筒体の先端側開口部を第２密封栓で封止し、他の開放端部は第３密封栓で封止し、該第２の円筒体と該第２密封栓及び第３密封栓により形成される室内に液状薬を充填されてなる容器ｂ、(4)上記第３密封栓の後部の窪に取り付けられる押棒、の(1)～(4)を有してなり、該容器ａの該第１密封栓で封止された後端開放部と、該容器ｂの第２密封栓で封止された先端開口部を気密に密着して該容器ａと該容器ｂが一体に結合されており、使用時には該第３密封栓の該窪に該押棒を取り付けて該第３密封栓を該容器ｂ内に押し込むことにより該第１密封栓及び該第２密封栓を該不連続部まで移動し、該不連続部の筒軸方向長さは上記第１密封栓の筒軸方向長さと上記第２密封栓の筒軸方向長さの和より長く設定してあるために該不連続部が該容器ａ内と該容器ｂ内を連通する通路を形成し、該容器ｂ内の該液状薬が該通路を経由して該容器ａ内に流入し、該濃縮薬と混和して注射薬となる注射器において、上記該容器ａと該容器ｂの結合が、容器ａの後端開放部外周壁面に螺設したねじと、容器ｂの先端開口部外周壁面に螺設したねじを、該容器ａ，該容器ｂの外径より大きい内径を有する筒状のコネクターの内周壁面に螺設したねじとそれぞれ螺合することによることを特徴とする２室を結合した注射器を提供する。

【０００９】

【発明の実施の形態及び実施例】本発明は二室結合型の容器兼注射器において、該容器の結合を容器端部に形成したねじ（螺子）の螺合による点を第一の特徴とするものであるが、本発明の構造、その作用機構等の特徴を実施例により詳細に説明する。図１は本発明の一実施態様を示す断面図であり、注射器兼容器（以下「注射器」と略記する場合もある）１は、それぞれが粉末又は濃縮薬品、液状薬品（薬液ともいう）を図示のように収納する容器である、円筒体ａ（以下筒ａとも略記する）及び円筒体ｂ（以下筒ｂとも略記する）を筒ａ，ｂそのものに設けたねじで結合してなる構造体である。図２は薬品充填以前の図１の注射器を筒ａ，筒ｂに分離した状態を示す断面図である。

【００１０】筒ａは円筒状の本体２と本体２より細い管状に突出した先端部を有し、該先端部の開放口にゴム栓３を打栓して封止しさらにキャップC_1でゴム栓３を開放口に固定してある。投与の際に該ゴム栓３とキャップC_1をつけたまま注射針の装着が可能な構造をしている。筒ａの他の開放端部すなわち筒ｂと結合する側の端部の内部には第１密封栓４を密嵌して容器を構成する。ゴム栓３と第１密封栓４との間に形成される空間（室）内には濃縮薬、凍結乾燥薬、結晶、顆粒、粉末薬、錠剤薬などの固形の薬品（以下、濃縮薬と総称する）５を充填し、該ゴム栓３と第１密封栓４により容器内を完全に密封し、気密に保持して、長期間にわたり濃縮薬５の品質を維持する。筒ａ本体２の内壁表面には、筒軸方向中央部よりやや第１密封栓よりの位置において、二室の間にバイパス流路を形成するための不連続部６が筒軸方向に沿って凹溝状に設けられ、該不連続部６の筒軸方向長さは、第１密封栓４と後述する第２密封栓１０の各筒軸方向長さの合計よりも大きくしてある。該第１密封栓４は筒内における摺動性も確保できるように、その材質については充分考慮して選択することが望ましい。

【００１１】筒ａ本体２の開放端部内周には内壁に彫り込んだめがたのねじ７（凹状螺子）を設けてある。また、筒ｂの先端部の外周には、前記めがたのねじ（螺子）７に螺合できるピッチでおがたのねじ（凸状螺子）８が螺設してあり、ねじ８の外径の最大値は筒ｂ本体９の外径より小さくされている。このねじ７，８を螺合することにより筒ａと筒ｂを簡単かつ強固に結合でき、本例では筒ａの外径D_1と筒ｂの外径D_2はほぼ同じであるため結合部分に凹凸を生ずることなく１本の円筒体を形成できる。なお、図示の例では筒ａにめがたのねじ、筒ｂにおがたのねじを螺設していが、筒ａにおがたのねじ、筒ｂにめがたのねじを設けることもできる。

【００１２】筒ｂの先端側内部には摺動可能な第２密封栓１０を密嵌して密封してあり、もう一方の端部である後端内には、第３密封栓１１を密嵌し、上記第２密封栓１０と該第３密封栓１１との間に形成される室内に溶解液、分散液、生理用食塩水液、注射用蒸留水などの液状薬（以下、「薬液」と総称する）１２を水密に収容している。

【００１３】上記筒ａ，ｂ及び第１～第３密封栓は、高圧蒸気滅菌の際の高温から凍結乾燥の際の約－５０℃といった低温に至っても変形に耐え且つ液漏れのない材質と構造となっている。即ち該第１，第２及び第３密封栓４，１０及び１１は筒本体２，本体９の内径より若干大きな外径を有し、筒ａ又はｂの内壁との摺動面には図３に示すようにリブ１３を３個以上設けて、筒内壁との密封性と摺動性という矛盾する特性を両立させてある。ただし本発明においては、表面に合成樹脂フイルムを積層したリブ無し密封栓を使用することにより、密封性と摺動性を両立させることもできる。また第３密封栓１１の後部には押棒を係合するためのねじ窪１４を設ける。

【００１４】以上の構成でも本発明の目的は十分に達成できるが、本実施例ではさらに、リブ部分より大きい外径の螺子をその外周に有するゴム栓１５を第３密封栓１１の後方に設けて、該ゴム栓１５には筒ｂの内壁面に接する外周部に環状の突起１６を設けたことにより、密封性をより向上している。

【００１５】本実施例の注射器は、容器ａ，容器ｂ内に

それぞれ薬品を充填した後、両容器を結合して製造する。具体的には、筒ａの後端と筒ｂの先端を合わせ、ねじ（螺子）７及び８を螺合して約１～３回転、好ましくは１～２回転することにより、簡単かつ確実に筒ａと筒ｂを直列に結合できる。第１密封栓４と第２密封栓１０とをできるだけ衛生的にかつ気密に密着させるために、クリンルーム内において真空下で筒ａと筒ｂを螺合することが好ましい。

【００１６】一般的に２つの円筒体を結合して一つの円筒体にする方法として、結合部分を接着する方法やセロファン又は合成樹脂製テープで両筒の外周を巻き固定する方法がある。しかし市販の接着剤あるいは市販のセロファン又は合成樹脂製テープに塗布されている接着剤は合成樹脂系接着剤であり、低発揮性、有毒性の不純物を多量に含むため、これらを用いて簡単に結合することは、衛生性、安全性の面で危険である。本発明のような物理的な結合手段によれば上記の危険性はすべて解消される。

【００１７】図３は筒ｂ内の薬液１２が筒ａへと移動して濃縮薬５と混合される状態を示す概略断面図である。即ち筒ｂ後部の第３密封栓１１のねじ窪１４に押棒１８を取り付け、該押棒１８を筒９内に押し込むことにより圧力が薬液１２に伝わり、第２密封栓１０と第１密封栓４は一緒に移動し、第１密封栓４、第２密封栓１０とが不連続部６に達した状態を示す断面図である。不連続部６は筒ｂ本体２の内壁面に彫り込まれた筒長さにのびる細い凹溝であり、その長さを第１密封栓４と第２密封栓１０の筒軸方向長さの合計より長くなるように設計してあるので、第１及び第２密封栓４，１０は不連続部６の中にはまりこみ、一方不連続部６の反対側の筒内壁面には突起１９を設けてあるので第１密封栓４の先端はこの突起１９で一時係止する。この状態で第１密封栓４及び第２密封栓１０と不連続部６の間が筒ａと筒ｂの間を連通する通路となる。押棒１８の環状突起２０は一時係止の目印となる。この第１密封栓４の一時係止の状態で押棒１８を徐々に押し込むことにより薬液１２は筒ａ内へと流れ込み、第３密封栓１１の先端が第２密封栓後端に当接するまで押棒を押し込むことにより薬液１２は筒ｂから完全に筒ａ内に流出する。筒ａ内で薬液１２と濃縮薬５は混和して規定の濃度の薬剤になる。不連続部６での薬液、残留気体等の流れを容易にするために振動を与えることも好ましい動作である。

【００１８】図４は図３のＡ－Ａ′方向断面図であり、筒ａの不連続部６の筒軸方向に垂直な断面を示している。

【００１９】図５は本発明の注射器で注射液を投与し終わった状態を示す概略断面図である。筒ａの先端に注射針２１（図示の例で両頭針）を取り付け、押棒１８を押しこみ、第１密封栓４，第２密封栓５及び第３密封栓１１を筒ａ内部の先端まで移動させることにより、溶解薬液（注射液）は注射針２１を経由して流出し、投与が完了する。C_2 はキャップである。

【００２０】本発明は図５に示されるように第１密封栓の先端側に窪みを設けて、注射器内、先端内壁、第１密封栓、注射針の周囲の間隙をなくして投与後に注射器内に残存する薬液１７の量を極少値にすることができる。従って本発明は例えば０．２～１ｍｌという小容積の注射器にして、極めて少量でかつ力価が高く規定量を確実に投与する必要のある高価な薬品を投与する目的に好適である。

【００２１】図６に本発明の他の実施例を示す。図６の実施例においては、筒ａの本体２の内径 d_1 を筒ｂの内径 d_2 よりも若干太く設計した。d_2 を１００とするとき d_1 を１０２～１０８の範囲に設計することによって第２密封栓１０の筒ａ内での摺動が容易になる。また、本例においては不連続部を筒軸方向断面において断面三角形の山部２２と谷部２３が周期的に繰り返される凹凸を有する形状にしてあり、不連続部の筒軸方向長さをＬ、第１密封栓４の筒軸方向長さ（厚さ）を l_4 第２密封栓１０の筒軸方向長さ（厚さ）を l_{10} とすればＬ＞$l_4 + l_{10}$ になるように設計する。図６の例では筒ａ内の末端内壁の第１密封栓との接触部に、環状の低い突起２４を設けて濃縮薬５を密封している。

【００２２】図７は図６の筒ａの不連続部のＢ－Ｂ′断面図である。該不連続部は筒ａの内壁面に断面三角形の突起２２と谷部２３が連続することにより形成されているので、第１密封栓４、第２密封栓１０が変形して通路２５を形成し、薬液１２が通過できる。

【００２３】図１，図２及び図６に示した本発明の各実施例では筒ａと筒ｂの本体の内径と外径はそれぞれほぼ等しいサイズであった。そのために結合部分の螺子は壁厚を薄くし形成されているが、本発明は螺子外径をほぼ本体部分外径と同じにすることもできる。

【００２４】図８は本発明のさらなる実施態様を示す概略断面図であり、本実施例では筒ａ本体２０１の後端外周におがたのねじ（螺子）７１を、筒ｂ本体９０１の筒ａ後端に接続する側の端部におがたのねじ（螺子）８１を設け、別の筒ｃの内壁面に前記ねじ７１，８１と螺合するめがたのねじ（螺子）２６を設けてコネクター２７とし、図示のように筒ａ，筒ｂはそれぞれコネクター２７と螺合することにより一体化される。本実施例では筒ａ本体２０１の外径 D_1 と筒ｂ本体９０１の外径 D_2 及びコネクター２７の内径 d_3 はほぼ同じであるコネクター２７の使用は結合部に若干の凹凸を生じるが、テープ巻き固定に比較すると前記した接着剤による弊害がないこと、固定がより確実であることにおいて優れている。

【００２５】以上の例では二つの筒の本体はほぼ同じサイズであったが、本発明においては螺合という結合を採用したことにより、２つの筒の本体部分は必ずしも同じ内径と外径にする必要はなく、以下の例に示すように筒

の壁厚さや内径を変化させることが可能となった。すなわち、本発明においては各筒内に収容する薬品の製剤処理や滅菌処理使用上に対応して適切な壁厚、内径の容器を設計できるという大きな利点がある。

【００２６】図９は本発明の実施例の筒ａと筒ｂの螺子と筒外径との関係を示す断面図である。筒ａ本体２０２の後端部の内壁をめがたのねじ（凹部）７２とし、筒ｂ本体９０２の先端部外周におがたのねじ（螺子）８２を設け、筒ａの内径をd_1，外径をD_1、筒ｂの内径をd_2，外径をD_2とするとき、本例では$d_1 = d_2$かつ$D_1 > D_2$と筒ａの壁厚を大きくしたことにより、図示のように筒ａ，ｂを直列に結合して一本の注射筒１としている。

【００２７】図１０は本発明の他の実施例を概略説明する断面図であり、本実施例では、筒ａ本体２０３の壁厚ｍを非常に厚くし、図示は省略した筒ｂの先端側（筒ａ側）の外周を包み込むように延長部２８を設けてある。本実施例では筒ａの端部からかなり先端よりの内壁部分に段差をつけてねじが設けられ、図示は省略しているが筒ｂにも同様に段差をつけて設けてある。これにより筒ａ内に筒ｂを誘導して内部に螺設したねじ７３との螺合が容易になる。なお、螺子７３のピッチ（巾）を広めにすると、筒の回転角度を３０～３６０℃、すなわち１回転までのねじりで強く結合でき、分離も容易である。この筒ｂのねじ部分にすぐ続く本体部分の肩になる部分が上記筒ａの段差部分と当接する位置に環状パッキン２９を配置しておくと、さらに密着性が向上するので、好ましい実施の態様である。

【００２８】図１１は本発明の他の実施例を概略説明する断面図であり、本実施例では筒ａの本体２０４の外径D_1を大きくし、壁厚さｍを厚くした。このように筒の壁を厚く設計することにより、筒ａ自体の容器としての物理的、化学的安定性を向上できると共に、筒ａの外周面形状を種々に加工して操作性の向上等を図れる。また模様として他のものとの区別を図ることもできる。すなわち、筒ａの外周面には指型凹部３０を設けたり、ほぼ円板型のフランジ３１を係合するための環状凹部３２を設けることができる。または筒ａの外周面に斜線状の凹凸、その他の形状の凹凸を設けることもできる。なお、筒ｂの外周面にも指型凹部あるいは斜線状凹凸等を設けることもある。７４はねじを表す。

【００２９】次に本発明により筒ａ，ｂ内に濃縮薬，薬液を製剤し、一本の注射筒として組み立てる工程を説明する。筒ａ，筒ｂ，ゴム栓、各密封栓等の薬剤に接触する部品はすべて予め、アルカリ洗浄、精製水洗浄などにより異物を除き、乾燥の後、高圧上記滅菌又はγ線滅菌工程を経たものを用いる。なお、筒ａ、筒ｂの筒本体の合成樹脂素材と密封栓の材質は高圧蒸気滅菌に耐える素材を選択する。

【００３０】本発明の筒ｂに液状薬を製剤する工程は、従来この種の製剤工程として公知の工程に従えばよい。簡単に説明すると、上記の洗浄、滅菌された筒ｂに第２密封栓１０を打栓した後に、溶解液、分散液、生理食塩水液、注射用蒸留水などの液状薬１２を充填し、次いで筒内に空気（酸素）が残留しないように真空下で第３密封栓１１を打栓した後に、高圧蒸気滅菌（蒸気温度１２５～１３０℃）を行なう。

【００３１】次に本発明の筒ａ内に例えば抗生物質，酵素，血清，ワクチン，蛋白，ビタミン製剤などの濃縮薬を製剤する工程を説明する。従来汎用される方法では、注射筒の先端口をゴム栓、キャップで封止し、無菌室内で注射筒の後端側から無菌混合した濃縮薬を充填し、濃縮後、該密封栓で封止した。これに対し、本発明の注射筒ａの一具体例においては図１２を参照して説明するように、後端側を密封栓で封止し先端側を上にした状態で濃縮薬を充填した後、先端側から濃縮することができる。後端側の方が断面積が広いため注射器の位置が安定している。すなわち、無菌室，クリーンルーム内等の滅菌環境下において、筒ａの開放端は第１密封栓で封止し、第１密封栓側を下にして先端口４１側から原料の希い薬液を規定量仕込む。図１２に示すように脚４２付きで、該脚４２には切欠き４３及び環状の突起４４を有するゴム栓S_1を筒ａの先端口４１に半打栓し、ゴム栓S_1の上にはキャップC_4を被せる。該キャップC_4にはキャップのスカート部３７の壁内側に溝３８を有しているので、半打栓状態で突起４４が先端口４１に係止して、先端口４１、切り欠き４３、溝３８が連続する通路を形成できる。真空条件下で筒ａ内の希い原料薬液は蒸発し、蒸気３９は該通路から排気され、濃縮薬（凍結真空乾燥薬）となる。完全に乾燥濃縮薬になると、同じ滅菌環境の室（槽）内に配置してある図示は省略した打栓装置により直ちにゴム栓S_1とキャップC_4を共に完全に打栓、封止することにより、筒ａ内に非常に衛生的に濃縮薬を密封することができる。この後、別工程により濃縮薬を混合、溶解する薬液を充填、封止した筒ｂと、上記で得た筒ａとを、螺合することにより一体の注射器として組み立てる。

【００３２】また、本発明において筒ａ内への製剤は筒ａの先端側を封止して後端側から薬剤を充填し、第１密封栓を半打栓状態にして濃縮することもできる。図１３は本発明の他の実施例において減圧槽室（又は凍結乾燥槽室）内で筒ａ内に充填した原料の薄い薬液５′を濃縮する工程を説明する図である。筒ａの本体２０５の先端はゴム栓S_2，キャップC_5で封止し、後端は第１密封栓４５を半打栓してある〔（イ）〕。（イ）部分のＣ－Ｃ′断面から矢印方向に見た俯瞰図を（ロ）に示す。該ゴム栓S_2，該第１密封栓４５の薬液，濃縮薬に接触する面には樹脂製フィルム４７を積層してある。また該第１密封栓４５は筒２０５との摺動面にリブ４８を３個有する。このリブ４８の１個だけを筒ａ後端内に入れ、第

２番目のリブを筒ａの後端のネジ７５の部分に係止することにより半打栓状態を保てる。本実施例は筒ａに設けたおがたのねじ７５の内壁面の対称の位置に筒軸方向に沿う２個の凹窪４９を有しており、半打栓状態で該凹窪４９は筒本体２０５の内壁との間に空隙を形成できるので、薬液の蒸気３９はこの凹窪４９を通路として排出される。十分に濃縮、乾燥した時点で、減圧槽室内においてそのまま第１密封栓を完全に打栓することにより、非常に衛生的に封止できる。

【００３３】図１４は図１３の製剤された筒ａ２０５のねじ７５と、別途薬液を製剤された筒ｂ本体９０５のめがたのねじ８５を螺合して組み立てた本発明の注射器の概略断面図である。筒ｂ本体９０５の先端の第２密封栓１０５と後端の第３密封栓１１５も、薬液接触面には樹脂製フィルム４７が積層されている。第３密封栓１１５の後ろには更にキャップ１５′を装着して固定を強化している。また筒ｂ９０５は後端側の内壁に凹部３０を有し、キャップ１５′との係合を強化してある。

【００３４】図１５は本発明のさらなる他の実施例において減圧槽室（又は凍結乾燥槽室）内で筒ａ内に充填した原料の薄い薬液５′を濃縮する工程を説明する図である。筒ａの本体２０６のリブＲを有する先端はゴム栓S_3，キャップC_6で封止し、後端は第１密封栓４６を半打栓してある〔（イ）〕。（イ）部分のＤ－Ｄ′断面から矢印方向に見た俯瞰図を（ロ）に示す。該第１密封栓４６は筒２０６との摺動面にリブ４８を３個有し、このリブ４８の１個だけを筒ａ２０６後端内に入れ、第２番目のリブを筒ａ２０６の後端のおがたのねじ７６の部分に係止することにより半打栓状態を保っている。本実施例は筒ａのねじ７６を対称な位置において２個所で開放端部から筒軸方向に向けて切り欠いており、半打栓状態で筒本体２０６の内壁との間に図１３の場合より広い通路を形成できる。薬液の蒸気３９はこの切欠き４９′を通路として排出される。十分に濃縮、乾燥した時点で、減圧槽室内においてそのまま第１密封栓４６を完全に打栓することにより、非常に衛生的に封止できる。なお６′は不連続部である。

【００３５】図１６は図１５の製剤された筒ａ２０６のねじ７６と、別途薬液を製剤された筒ｂ９０６のめがたのねじ８６をパッキング２９を介在させて螺合し、組み立てた本発明の注射器の概略断面図である。筒ｂ９０６の先端の第２密封栓１０６と後端の第３密封栓１１６も、薬液接触面には樹脂製フィルム４７が積層されている。第３密封栓１１６の後ろには更にキャップ１５′′を装着して固定を強化している。また筒ｂ９０６は後端側の内壁に突起を有し、キャップ１５′′との係合を強化してある。上記の筒ａ２０６と筒ｂ９０６との結合工程もクリンルーム内で行なうことが好ましい。本発明は結合工程を簡単かつ確実に実施できるので、作業工程上有利である。

【００３６】図示は省略したが、本発明のさらに他の実施例においては、筒ａの後端の開放部近傍に孔を設けることによって、図１３、図１５の例と同様の作用効果を得ることができる。

【００３７】次に本発明の注射器の筒ａの注射針取り付け側である先端部の構造を説明する。図１０の実施例においては、筒ａの先端口の外周面に突起を設け、図示は省略したゴム栓の内壁には該突起と係合する環状凹部を設けて、先端の密封を確実にしてある。また図１５及び図１６に示す本発明の一具体例では、筒ａの先端口の外周に本体２０６から突出した筒状のカラーC_7を有し、該カラーC_7は内壁面にリブＲが２本形成されている。このカラーC_7内にフランジ付ハブ注射針基を容易に固定することができる。また該筒ａの先端口はゴム栓S_3で密封され、該ゴム栓S_3はキャップC_6で固定されている。

【００３８】本発明注射器は０．２～１ｍｌという小容量から５０ｍｌ程度の大容量まで広いサイズ範囲に適合でき、しかも大容量の筒内に収納した、吸湿性大で易酸化性の不安定な薬についても３～５年間という長期保存を実現することを目指した。この目的のために、本発明の第１、第２、第３密封栓（以下滑栓とも総称する）は高い密封栓と摺動性の両立が要求される。該滑栓の材質としては、例えばＪＩＳ硬度３０近傍の比較的軟かい材質で、耐熱性を有し、圧縮歪のない加熱ゴム弾性体、例えば１００℃で圧縮歪量約１０％のゴム弾性体などが好ましい。また密封栓の形状としては、筒内壁との摺動部分に環状のリブを３個以上設けたものが好ましい。その他、この種の分野における公知技術を最高度に適用することが望ましい。

【００３９】図１７は本発明の注射器を包装した完成製品の一実施例を示す概略断面図である。濃縮薬５を筒ａ内に、薬液１２は筒ｂ内に収容し、ゴム栓３′、第１密封栓４′、第２密封栓１０、第３密封栓１１で各々を密封している。該筒ａと筒ｂは端部に形成されたねじ７とねじ８を螺合することにより強固に結合一体化して、凹凸のない一本の円筒形をなしている。製剤された本発明の注射器は、例えば図１７に示すような包装体３４に入れ、防振ゴム３５を配置し、ゴム栓３６で密封する。これにより運搬による振動から保護できる。この形状は容器全体の包装が簡単である。

【００４０】なお、図１７の実施例では押棒１８′が両頭の注射針（両頭針）３３の収納容器を兼ねていて、使用時には、第３密封栓１１に係合している押棒１８′を筒ｂの内部に押し込み、液状薬１２が全部濃縮薬５と混合、移動終了した後に、筒ａと筒ｂの螺合を解除して両者を分離する。次に押棒１８′から両頭針３３を取り出して先端ゴム栓３′に穿刺，貫通し、両頭針３３内部を通路として薬液を投与する。前記押棒１８′は筒ｂ、又は筒ａの長さであれば充分効果を奏する。このように２

室結合タイプにすると押棒長さは従来より短いものでよくなる。

【００４１】本発明の注射器は螺合しているので、従来品より結合部分の間隙や凹凸が少ないこと、外径が同サイズの容器を採用すれば、全体で凹凸が少ない一本の円筒体を形成するので容器との間隙も小さくコンパクトに包装でき、携帯にも便利である。また、包装体との間の間隙が少ないほど、注射器内に侵入するおそれのある空気等の酸化促進物質の存在量も低減でき、薬品の品質保持に有効である。

【００４２】また、本発明は筒ａ、筒ｂの結合が容易であると共に分離することも可能であるため、筒ａ内の薬と筒ｂの液状薬の組合せを種々に変化できる。例えば筒ａ内には抗癌薬あるいは抗生物質を製剤しておき、筒ｂの液状薬は注射用蒸留水又は生理食塩水を組み合わせる等であり、一室を分割するタイプに比較して製造工程が簡単で、能率的であることは言うまでもない。この場合には筒ａと筒ｂを別個に選択できる形態で製品とすることもできる。さらに、医師等が組合せを選択して投与したいケースにも対応でき、研究用途等にも好適である。

【００４３】以上のような構造の本発明の注射器を構成する材質について以下に説明する。本発明は注射器としての人体への安全性と耐薬品性は必須の要件であるが、さらに薬品容器として上記のように物理的特性、化学的特性、安定性、環境条件に対する感受性の異なるいずれの薬品に対しても充分気密に、空気（酸素）、水分（湿度）、温度等の環境からの影響を受けずに保存できる材質を選択する必要がある。滑栓についてはすでに説明したとおりである。本発明の注射器の容器本体（筒）の材料としては、ガラス、合成樹脂等が挙げられるが、螺合により結合するので、精密な形状にねじを設けることが必須であり、成形性も考慮すると合成樹脂が好ましく、例えば環状オレフィン系化合物又は架橋多環式炭化水素化合物を重合体成分とする樹脂、ポリエチレン、ポリプロピレン、ポリカーボネート、ポリメチルペンテン、ポリエステル樹脂等の１種以上を用いることができる。また、２種以上の材料を積層することも好ましい。さらには合成樹脂表面に酸化珪素、酸化マグネシウムを蒸着したものも好ましい。合成樹脂の成形、加工はこの種技術分野における公知の技術のいずれをも利用できる。注射針部分についても公知技術を適用する。

【００４４】本発明の包装体材料としては、例えばポリエステル、ポリスルホン、ポリアリレート、変性フェニレンオキシド樹脂、ポリアミド、ポリビニールアルコール、ポリ酢酸ビニルなどを相互に３～５層に積層した材料が挙げられる。上記積層樹脂表面に酸化珪素、酸化アルミニウム、酸化マグネシウムなどを蒸着したものは、酸素、空気、水分（湿度）に対するバリア作用があり、注射器内に充填された医薬品の品質を保持して長期保存するために好適である。

【００４５】

【発明の効果】本発明は各々薬品を充填した２個の容器を、容器自体に螺設した螺子の螺合により直列に結合してなる注射器兼容器であり、その効果は下記のとおりである。

(1)２個の円筒体容器を直接に螺子部で嵌合するので、小容積で強力に結合する、又円筒体の分離も容易である。

(2)容器自体に形成した螺子で物理的に結合するので、接着剤や熱溶着等の必要がないため、製剤工程上有利であるに加え、熱や接着剤等による品質低下の危険性を解消できた。

(3)螺子による結合であるため、２個の容器のサイズ、壁厚を任意に調整できて、内部に充填する薬品の製剤工程、剤形に応じて好適な組合せを選択できる。

(4)濃縮薬を充填する容器ａの本体円筒の内径を容器ｂの内径より若干太くしたタイプのものでは、小さい滑力で投与できる。

(5)容器サイズを適宜組み合わせることができるため、例えば規定された濃縮薬に対して、液状薬の種類、サイズを種々にを変えた組合せのものも容易に製造し、使用できる。

(6)２種の薬品を別々に製剤できるので、製造工程が簡略化される。

(7)従来の分割式注射器にくらべ小容積の容器であることに加え、押棒部分も従来品により短くできるので、一バッチで従来品より多量を処理できて、製造効率向上とコスト低下を実現できる。

(8)容器ａと容器ｂは完全に気密に遮断される構造となっており、濃縮薬の保存に液状薬が影響することを防止できるので、長期にわたり安定した高品質を保証できる。

(9)注射器は小さくまとまり、包装も簡素となり、携帯に便利である。

(10)容器本体、ゴム栓、密封栓、押棒、注射、包装体針等をすべて廃棄物処理が簡単な合成樹脂製とすれば、環境保護問題にも対応できる。

【図面の簡単な説明】

【図１】　本発明の一実施例を説明する概略断面図である。

【図２】　図１の注射器の筒ａと筒ｂの構造を説明する断面図である。

【図３】　図１の注射器において筒ｂ内の薬液を筒ａ内に移送する状態を説明する概略断面図である。

【図４】　図３のＡ－Ａ´断面図である。

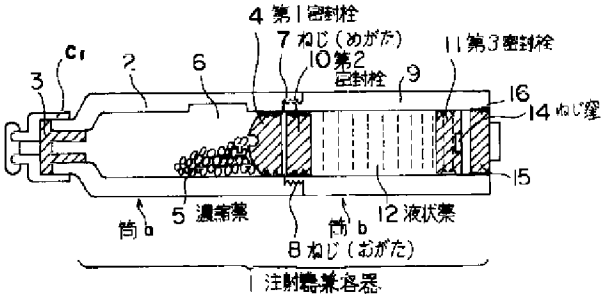
【図５】　図１の注射器の投与終了時の状態を説明する概略断面図である。

【図６】　本発明の実施例における不連続部近傍の構造を説明する部分断面図である。

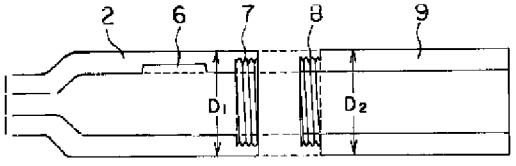
【図７】　図６のＢ－Ｂ´断面図である。

【図８】　本発明の他の実施例におけるコネクターによる結合を説明する概略断面図である。
【図９】　本発明の他の実施例における筒ａと筒ｂのサイズの関係を説明する概略断面図である。
【図１０】　本発明の他の実施例おいて本体壁厚さが大きく異なる筒ａと筒ｂの構成を示す概略断面図である。
【図１１】　本発明の他の実施例における筒ａの外周面の加工を示す概略説明図である。
【図１２】　本発明の他の実施例において切り欠きを有するキャップとゴム栓を用いて凍結乾燥する工程を説明する部分断面図である。
【図１３】　本発明の他の実施例において筒ａ後端部の凹窪を蒸気の通路として原料の希い薬液を濃縮する工程を説明する図である。
【図１４】　図１３の製剤工程を終え筒ａと筒ｂを組み立てた本発明の注射器を説明する概略断面図である。
【図１５】　本発明の他の実施例において筒ａのねじ部分の切り欠きを蒸気の通路として原料の希い薬液を濃縮する工程を説明する図である。
【図１６】　図１５の製剤工程を終え筒ａと筒ｂを組み立てた本発明の注射器を説明する概略断面図である。
【図１７】　本発明の注射器を包装した一例を示す概略断面図である。
【図１８】　従来の一本の注射筒を滑栓により二分割した２室式容器兼注射器の概略断面図である。
【図１９】　従来の二室を結合するタイプの容器兼注射器の一例の注射筒部分の概略断面図である。
【図２０】　図１９の注射筒部分と組み合わせる注射針部分の概略断面図である。
【符号の説明】
１　注射器兼容器、２，２′，２′′，２０１，２０２，２０３，２０４，２０５及び２０６筒ａ本体、３，３′，３６及び３８並びにS_1，S_2及びS_3　ゴム栓、４，４′，４５及び４６　第１密封栓、５　濃縮薬、５′原料の希い薬液、６，６′不連続部、７，７１，７２，７３，７４，７５及び７６　ねじ、８，８１，８２，８５及び８６　ねじ、９，９０１，９０２，９０５及び９０６　筒ｂ本体、１０，１０５及び１０６　第２密封栓、１１，１１５及び１１６　第３密封栓、１２　液状薬、　１３　リブ、　１４　ねじ窪、１５及び１５′　ゴム栓、　１６　突起、　１８及び１８′　押し棒、１９及び２０　突起、　２１　注射針、　２２　山部、２３　谷部、２４　突起、　２５　流路、２６　コネクターのねじ、２７　コネクター、　２８　延長部、２９　パッキン、　３０　指型凹部、　３１　フランジ、３２　環状凹部、　３３　両頭針、　３４　包装体、３５　防振ゴム、３７　スカート部、　３８　溝、　３９　蒸気、４１　先端口、　４２　脚　４３　切り欠き、４４　環状の突起、　４７　樹脂製フィルム、　４８　リブ、４９　凹窪、　４９′切り欠き、C_1，C_2，C_4，C_5及びC_6　キャップ、d_1　筒ａの内径、　d_2　筒ｂの内径、d_3　コネクターの内径、D_1　筒ａの外径、　D_2　筒ｂの外径、l_4　第１密封栓長さ、　l_{10}　第２密封栓長さ、Ｌ　不連続部長さ、　ｍ　壁厚さ、　５０　注射器兼容器、５１　先端部、　５２　滑栓、　５３　注入溝、５４　滑栓、　５５　前室、　５６　粉末薬、５７　後室、　５８　溶解液、　５９　粉末薬、６０　希釈液、　６１，６２　小型容器、　６３　ゴム栓、６４　フランジ付きゴム栓、　６５　滑栓、　６７　包装体、６８　ホルダー、　６９及び７０　注射針、　７１　開口。

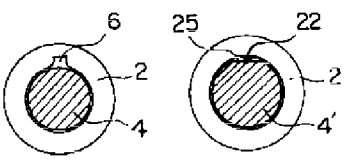
【図１】



【図２】

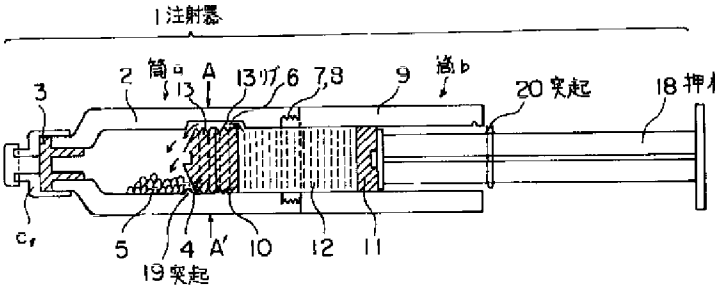


【図４】

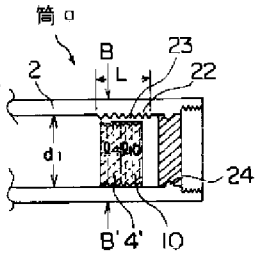


【図７】

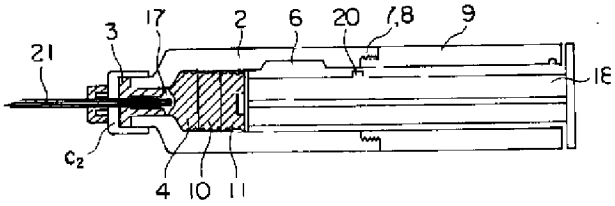
【図３】



【図６】



【図５】



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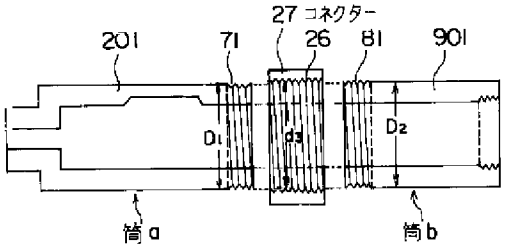

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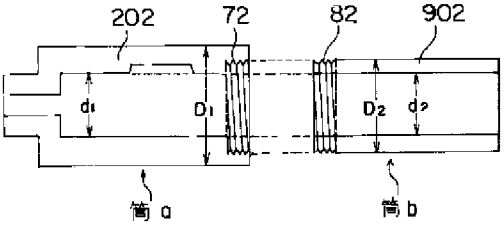
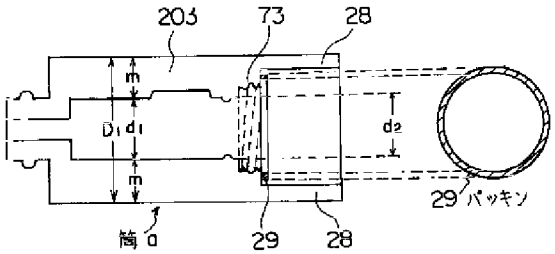
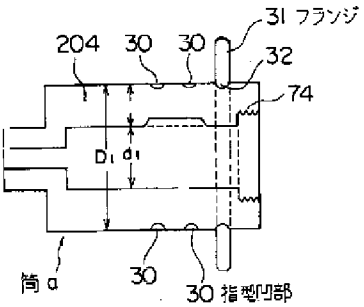


【図１０】



【図１１】



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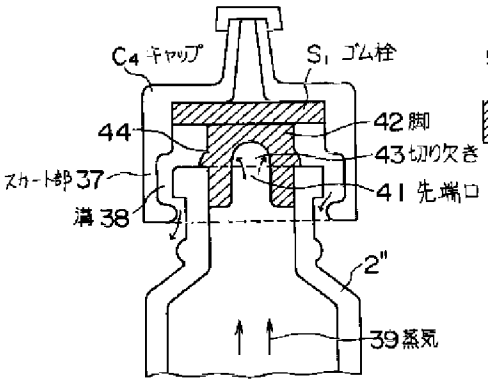

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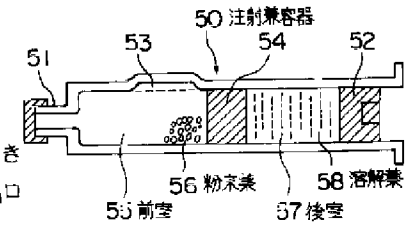
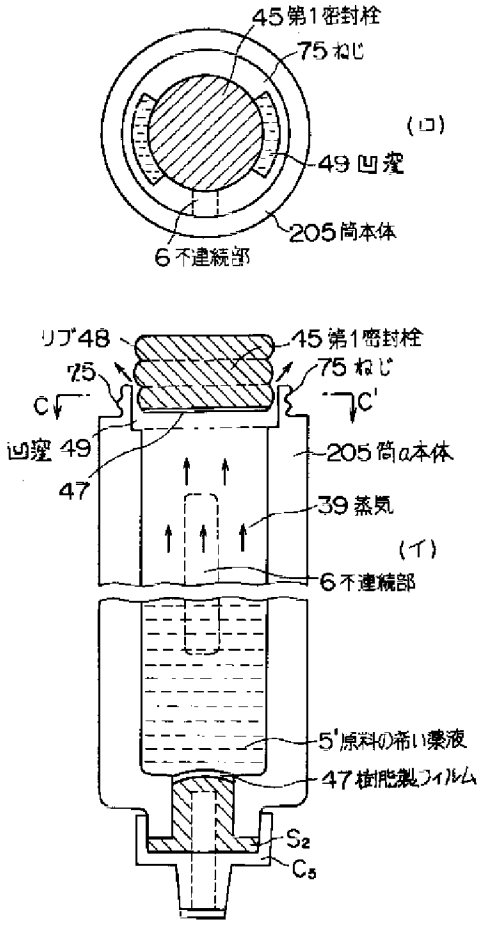


【図13】



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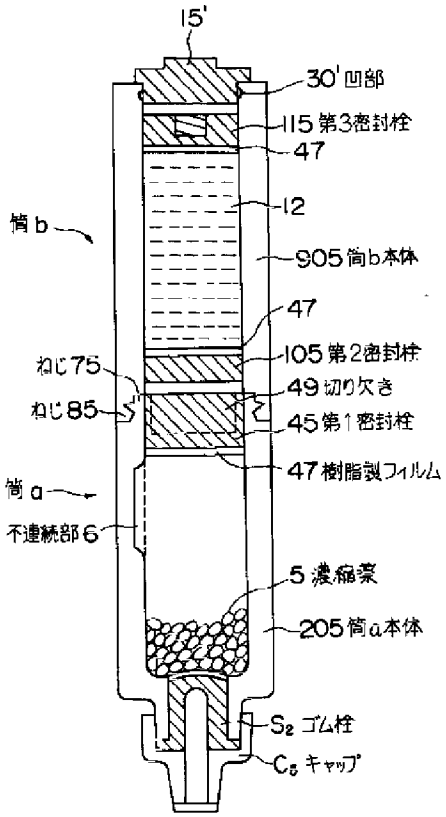
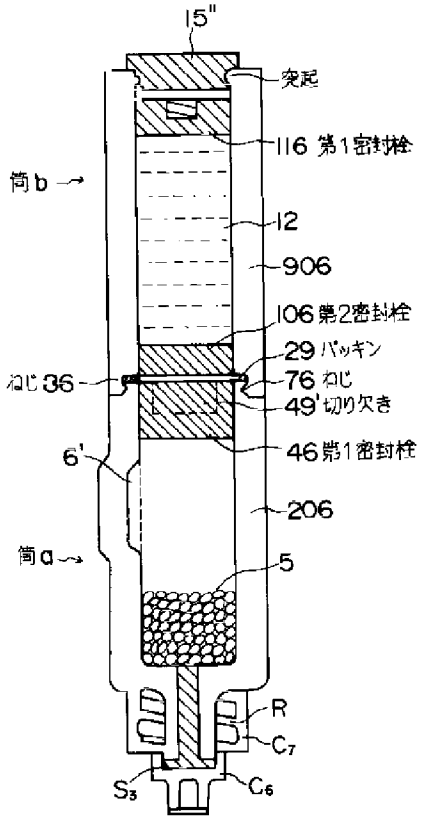


【図16】



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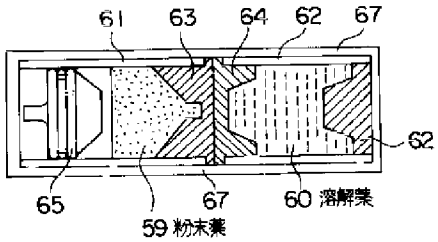
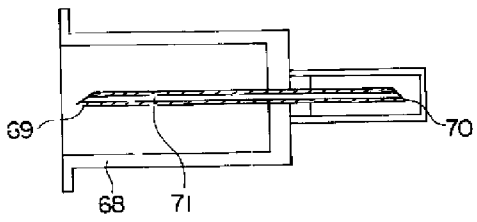
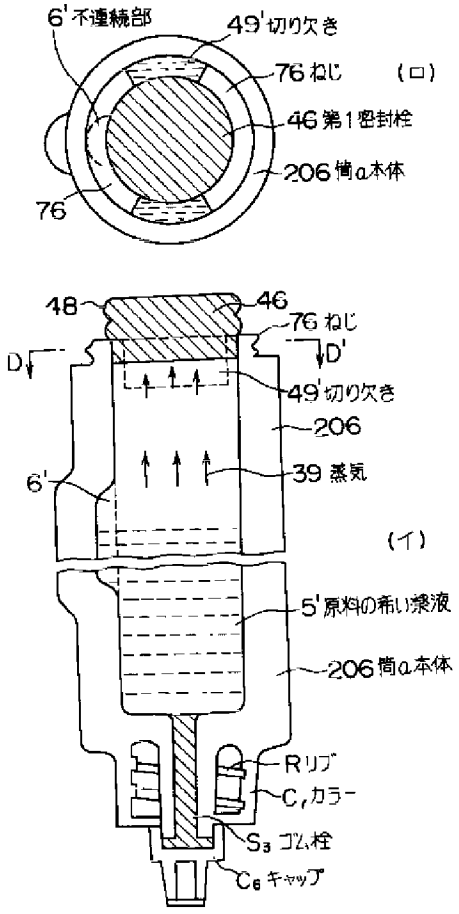


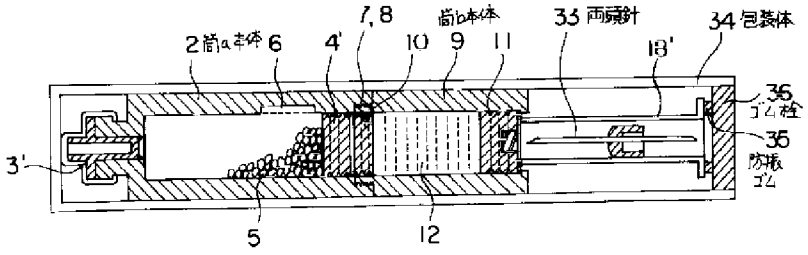
【図20】



【図１５】


6' 不連続部
49' 切り欠き
76 ねじ
(ロ)
46 第1密封栓
206 筒a本体
76
48
46
76 ねじ
D
D'
49' 切り欠き
206
6'
39 蒸気
(イ)
5' 原料の希い薬液
206 筒a本体
Rリブ
C7 カラー
S3 ゴム栓
C6 キャップ

【図１７】


2 筒a本体
6
4'
7,8
筒b本体
10
9
11
33 両頭針
18'
34 包装体
36 ゴム栓
35 防振ゴム
3'
5
12